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ABSTRACT

This document records the oral and written testimony given at a U.S. House of Representatives subcommittee hearing on technical training and productivity. Witnesses who provided testimony included an official of the National Science Foundation, several administrators of manufacturing companies, a representative of community colleges, and representatives of the U.S. Departments of Commerce, Labor, and Education. Witnesses testified about the need for better educated workers now and in the future, and they described programs in community colleges and manufacturing that have been training employees successfully and raising productivity. In general, most witnesses supported H.R. 2936 and H.R. 3507, which would create technical education centers and improve the technical training of youths and adult employees. Many of those who testified stressed the need to educate and train those youths who do not go to a four-year college so that they will have the flexibility and the skills to compete in the work force of the future. Most of the discussion focused on technical skills and higher-level reading skills, rather than on basic literacy education. (KC)

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TECHNICAL EDUCATION, WORK FORCE TRAINING, AND U.S. COMPETITIVENESS

ED 348 538

HEARING

BEFORE THE

SUBCOMMITTEE ON
TECHNOLOGY AND COMPETITIVENESS

OF THE

COMMITTEE ON
SCIENCE, SPACE, AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED SECOND CONGRESS

FIRST SESSION

SEPTEMBER 17, 1991

[No. 85]

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Committee on Science, Space, and Technology

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TECHNICAL EDUCATION, WORK FORCE TRAINING, AND UNITED STATES COMPETITIVENESS

TUESDAY, SEPTEMBER 17, 1991

U.S. House of Representatives,
Committee on Science, Space, and Technology,
Subcommittee on Technology and Competitiveness,
Washington, D.C.

The Subcommittee met, pursuant to notice, at 1:35 p.m. in room 2318, Rayburn House Office Building, Hon. Tim Valentine [Chairman of the Subcommittee] presiding.

Mr. Valentine. Good afternoon, ladies and gentlemen. I call the hearing to order.

Fifty percent of the Nation's high school students are confined to the so-called "general track." That is where the schools put young people who are not likely to go to college, and it is there that these students stay until they are graduated or until they drop out. When will we in the Congress and outside of the Congress realize that both the top third and the bottom third of our academic achievers affect our Nation's future and ability to compete?

My staff has estimated that 4,083 young people will drop out of the schools in my congressional district this year, and if this doesn't frighten you by itself, multiply that figure by 435 to get some idea of how many children will drop out nationally. The figure comes to 1,776,105.

In America, we believe in the power of the individual. We believe that we can pull ourselves up by our own boot straps, and I believe that, too, and I think most Members of the Committee would share that belief, but I must admit—and I think we should admit to each other—that it's pretty difficult to pull yourself up by one's boot straps if one has no shoes because his or her mother can't read what you and I could read when we were in the third grade.

Many of the problems that we talk about around the office are actually one problem. In this case, poverty and competitiveness are linked. How can we solve one without first solving the other? For example, we can fairly accurately calculate the probability that a child will drop out of school by asking just four questions, and I find this rather disturbing. The first question: Did your parents graduate from high school? Do you live in an inner city? Are you black or Hispanic? What is your family income level?

We must find a way to stop this cycle, to pull apart this entanglement of social problems. We must stop this endless merry-go-round on which the Nation's "throwaway children" are riding. To do this, our policy must focus on renewing our own people. We must develop a national human resources infrastructure and policy beyond what we can yet conceive.

On the other side of this fence is the ability of our Nation's industry to deliver quality, low-cost products to the world marketplace. The Nation's standard of living is at stake. Some individuals do not yet believe that the Nation is facing a shortage of skilled labor. A recent report from the Commission on the Skills of the American Work Force makes the following point, and I quote:

"Most American employers report no shortage of people who have [advanced] skills and foresee no such shortage. The reason we have no skills shortage today is that we are using turn-of-the-century work organization[s]. If we want to compete more effectively, we will have to move to a high productivity work organization [which does require advanced skills]."

In short, if we wish to bury our heads in the sand, then we have no skills gap. If we wish to remain a prosperous nation, we do have a tremendous skills, education, and literacy gap.

This hearing today we hope will permit the Subcommittee to discuss these issues and to review two bills that place emphasis on developing our national human resource infrastructure: first, H.R. 2936, the Technical Education and Training Act of 1991, which has been introduced by our colleague, the gentleman from North Carolina, Mr. David Price, who is here to testify; and my own bill entitled the National Competitive Industry Work Force Act of 1991, which we expect to introduce later this month.

Mr. Price's bill focuses on promoting public-private partnerships to strengthen the Nation's technical education and training programs. Our bill addresses U.S. industrial competitiveness through the creation of work force training programs tied directly to private sector firms. Both bills strive to strengthen the Nation's training infrastructure and ensure that the proper information is collected for further policy development, review, and oversight.

We are honored today by having an outstanding group of experts to tell us more about these issues and to assess the quality of the aforementioned bills, and we have, as I've stated, our colleague, David Price from the 4th District of North Carolina, who will describe his legislation; and we have also Dr. Luther Williams, who is Assistant Director for Education and Human Resources at the National Science Foundation; and we have with us Mr. Ira Magaziner, who is Chairman of the Commission on the Skills of the American Work Force; Ms. Margaret Quesada, Team Member of the General Maintenance Group of NUMMI, which stands for New United Motor Manufacturing, and we believe that this young woman will have a message of special interest, as she has been with her own hands assembling automobiles for 15 years and has achieved a high level of respect with her coworkers and has, we think, a message from a different perspective. We also have Dr. Anthony Carnevale, who is Vice President and Chief Economist for the American Society for Training and Development; Mr. James E. Schwarz—incidentally, we do intend to finish today, but that is not required, and by today, I mean before 12:00 tonight—Mr. James E. Schwarz is President of Omni-Circuits, Inc., which is a major supplier of Motorola Corporation; and finally, Mr. David Pierce, who is President of the American Association of Community and Junior Colleges.

In my statement, I mentioned a few of the other issues related to the topic of technical education and work force training. In reality, there are many more. There is in fact a "box" full of these issues which I believe looks like a box which contains a bunch of coat hangers all tangled up and intermeshed together in what would appear to be hopeless disarray, and we welcome all of you and look forward to hearing your statements and ask for your opinions and judgment as to how we might continue to effect some way to approach with intelligence the tangled mess which we perceive.

With apologies for the length of this opening statement, I will recognize our esteemed friend and the Ranking Member of our Subcommittee, Mr. Tom Lewis from the State of Florida.

[The prepared statement of Mr. Valentine follows:]

OPENING STATEMENT

THE HONORABLE TIM VALENTINE, (D-NC)

HEARING

TECHNICAL EDUCATION, WORKFORCE TRAINING, AND U.S. COMPETITIVENESS

SEPTEMBER 17, 1991

GOOD AFTERNOON LADIES AND GENTLEMEN--I WOULD LIKE TO CALL THIS HEARING TO ORDER. FIFTY PERCENT OF THE NATION'S HIGH SCHOOL STUDENTS ARE CONFINED TO THE SO CALLED, "GENERAL TRACK." THIS IS WHERE SCHOOLS PUT YOUNG PEOPLE WHO ARE NOT LIKELY TO GO TO COLLEGE. AND IT IS THERE THAT THOSE STUDENTS STAY UNTIL THEY GRADUATE OR UNTIL THEY DROP OUT. WHEN WILL WE REALIZE THAT BOTH THE TOP THIRD AND THE BOTTOM THIRD OF OUR ACADEMIC ACHIEVERS AFFECT OUR NATION'S FUTURE AND ABILITY TO COMPETE?

MY STAFF HAS ESTIMATED THAT FOUR THOUSAND EIGHTY THREE YOUNG PEOPLE WILL DROP OUT OF THE SCHOOLS IN MY CONGRESSIONAL DISTRICT THIS YEAR. IF THAT DOES NOT FRIGHTEN YOU BY ITSELF, MULTIPLY THAT FIGURE BY FOUR HUNDRED THIRTY FIVE TO GET SOME IDEA HOW MANY YOUNG PEOPLE WILL DROP OUT NATIONALLY. THAT COMES TO ONE MILLION SEVEN HUNDRED SEVENTY SIX THOUSAND, ONE HUNDRED FIVE.

IN AMERICA, WE STILL BELIEVE IN THE POWER OF THE INDIVIDUAL. WE BELIEVE THAT YOU CAN PULL YOURSELF UP BY THE BOOT STRAPS. I DO TOO. BUT I MUST ADMIT, IT HAS TO BE PRETTY DIFFICULT TO PULL YOURSELF UP BY THE BOOT STRAPS IF YOU HAVE NO SHOES, BECAUSE YOUR MOTHER CAN'T READ WHAT YOU AND I COULD READ IN THE FOURTH GRADE AND CAN'T GET A JOB.

YOU SEE, MANY OF THE PROBLEMS THAT WE TALK ABOUT AROUND THE OFFICE ARE ACTUALLY ONE. IN THIS CASE, POVERTY AND COMPETITIVENESS ARE LINKED. HOW CAN YOU SOLVE ONE WITHOUT FIRST SOLVING THE OTHER?

FOR EXAMPLE, WE CAN FAIRLY ACCURATELY CALCULATE THE PROBABILITY THAT A CHILD WILL DROP OUT OF SCHOOL BY ASKING JUST FOUR QUESTIONS. I FIND THIS DISTURBING.

- DID YOUR PARENTS GRADUATE FROM HIGH SCHOOL?
- DO YOU LIVE IN AN INNER CITY?
- ARE YOU BLACK OR HISPANIC?
- WHAT IS YOUR FAMILY INCOME LEVEL?

WE MUST FIND A WAY TO STOP THIS CYCLE, TO PULL APART THIS ENTANGLEMENT OF SOCIAL PROBLEMS. WE MUST STOP THIS ENDLESS MERRY-GO-ROUND ON WHICH THE NATION'S "THROW-AWAY CHILDREN" ARE RIDING.

TO DO THIS, OUR POLICY MUST FOCUS ON RENEWING OUR OWN PEOPLE. WE MUST DEVELOP A NATIONAL HUMAN RESOURCES INFRASTRUCTURE AND POLICY BEYOND WHAT WE CAN YET CONCEIVE.

ON THE OTHER SIDE OF THIS FENCE IS THE ABILITY OF OUR NATION'S INDUSTRY TO DELIVER QUALITY, LOW COST PRODUCTS TO THE WORLD MARKET PLACE. THE NATION'S STANDARD OF LIVING IS AT STAKE. SOME INDIVIDUALS DO NOT YET BELIEVE THAT THE NATION IS FACING A SHORTAGE OF SKILLED LABOR.

IT IS THE RECENT REPORT FROM COMMISSION ON THE SKILLS OF THE AMERICAN WORKFORCE THAT MAKES THIS POINT:

"MOST AMERICAN EMPLOYERS REPORT NO SHORTAGE OF PEOPLE WHO HAVE [ADVANCED] SKILLS AND FORESEE NO SUCH SHORTAGE. THE REASON WE HAVE NO SKILLS SHORTAGE TODAY IS THAT WE ARE USING TURN-OF-THE-CENTURY WORK ORGANIZATION[S]. IF WE WANT TO COMPETE MORE EFFECTIVELY, WE WILL HAVE TO MOVE TO A HIGH PRODUCTIVITY WORK ORGANIZATION [WHICH DOES REQUIRE ADVANCED SKILLS]."

IN SHORT, IF WE WISH TO BURY OUR HEADS IN THE SAND, THEN WE HAVE NO SKILLS GAP. IF WE WISH TO REMAIN A PROSPEROUS NATION, WE DO HAVE A TREMENDOUS SKILLS, EDUCATION, AND LITERACY GAP.

THIS HEARING WILL PERMIT THE SUBCOMMITTEE TO DISCUSS THESE ISSUES AND TO REVIEW TWO BILLS THAT PLACE EMPHASIS ON DEVELOPING OUR NATIONAL HUMAN RESOURCE INFRASTRUCTURE: H.R. 2936, "THE TECHNICAL EDUCATION AND TRAINING ACT OF 1991," WHICH HAS BEEN INTRODUCED BY THE GENTLEMAN FROM NORTH CAROLINA, MR. DAVID PRICE; AND MY OWN BILL, "THE NATIONAL COMPETITIVE INDUSTRY WORKFORCE ACT OF 1991," WHICH I EXPECT TO INTRODUCE LATER THIS MONTH.

MR. PRICE'S BILL FOCUSES ON PROMOTING PUBLIC-PRIVATE PARTNERSHIPS TO STRENGTHEN THE NATION'S TECHNICAL EDUCATION AND TRAINING PROGRAMS. MY OWN BILL ADDRESSES U.S. INDUSTRIAL COMPETITIVENESS THROUGH THE CREATION OF WORKFORCE TRAINING PROGRAMS TIED DIRECTLY TO PRIVATE SECTOR FIRMS. BOTH BILLS STRIVE TO STRENGTHEN THE NATION'S TRAINING INFRASTRUCTURE AND ENSURE THAT THE PROPER INFORMATION IS COLLECTED FOR FURTHER POLICY DEVELOPMENT, REVIEW, AND OVERSIGHT.

WE ARE HONORED TODAY BY HAVING AN OUTSTANDING GROUP OF EXPERTS TO TELL US MORE ABOUT THESE ISSUES AND TO ASSESS THE QUALITY OF THE AFOREMENTIONED BILLS. WE HAVE:

MY COLLEAGUE,
THE HONORABLE DAVID E. PRICE
OF THE 4TH DISTRICT OF NORTH CAROLINA
TO TELL US MORE ABOUT HIS BILL, H.R. 2936;

DR. LUTHER S. WILLIAMS, WHO IS ASSISTANT
DIRECTOR FOR EDUCATION AND
HUMAN RESOURCES AT THE
NATIONAL SCIENCE FOUNDATION;

MR. IRA MAGAZINER
CHAIRMAN OF THE COMMISSION ON THE
SKILLS OF THE AMERICAN WORKFORCE;

MS. MARTHA QUESADA
TEAM MEMBER OF THE GENERAL
MAINTENANCE GROUP OF
NUMMI WHICH STANDS FOR
NEW UNITED MOTOR MANUFACTURING;

INCIDENTALLY, I WOULD LIKE TO ISSUE A SPECIAL WELCOME TO MS. QUESADA, SHE MUST KNOW ABOUT TRAINING BETTER THAN ANY OF US. SHE HAS BEEN ASSEMBLING AUTOMOBILES FOR FIFTEEN YEARS AND HAS ACHIEVED A HIGH LEVEL OF RESPECT FROM HER CO-WORKERS.

WE ALSO HAVE,
DR. ANTHONY CARNEVALE
WHO IS VICE PRESIDENT AND
CHIEF ECONOMIST FOR THE,
AMERICAN SOCIETY FOR TRAINING
AND DEVELOPMENT;

MR. JAMES E. SCHWARZ,
PRESIDENT OF OMNI-CIRCUITS, INC.
WHICH IS A MAJOR SUPPLIER OF
MORTOROLA CORPORATION;

AND FINALLY, DR. DAVID PIERCE,
WHO IS PRESIDENT OF THE AMERICAN
ASSOCIATION OF
COMMUNITY AND JUNIOR COLLEGES.

IN MY STATEMENT I HAVE MENTIONED A FEW OF THE ISSUES RELATED TO THE TOPIC OF TECHNICAL EDUCATION AND WORKFORCE TRAINING. IN REALITY THERE ARE MANY MORE. THERE IS, IN FACT, A "BOX" FULL OF THESE ISSUES--ALL TANGLED TOGETHER LIKE WIRE HANGERS. LET US TRY, TODAY, TO UNTANGLE SOME OF THESE ISSUES WITH OUR EXPERT WITNESSES. I WELCOME ALL OF YOU, I LOOK FORWARD TO HEARING YOUR STATEMENTS, AND THANK YOU FOR JOINING US TO SHARE YOUR OPINIONS. AND WITH THOSE WORDS, I WOULD LIKE TO RECOGNIZE MY COLLEAGUE AND FRIEND, THE GENTLEMEN FROM FLORIDA, MR. TOM LEWIS.

Mr. **Lewis**. Thank you, Mr. Chairman, and I apologize for being late. There is just not enough of me to go around today. I am very much interested in this hearing and what we glean from it.

A recent article stated that one major U.S. employer tested 23,000 applicants for entry-level jobs and 84 percent failed. Another employer in a technical field found that 90 percent of the entry-level applicants could not meet the ninth grade math skills. Consequently, U.S. industry suffers productivity losses caused by poorly trained workers and remedial training costs for over $25 billion annually, according to *Space News*.

Can our educational system meet the needs of future high- technology education while at the same time teach the basics of reading, writing, and arithmetic? How can we motivate today's students to want to learn science and technology? What changes in policy, if any, do we need in order for our education system to provide well-trained students to work effectively in industry, both today and tomorrow?

I think this is a very serious situation that has been simmering on the back burner, and if we're not careful, it's going to boil over and create havoc throughout our industry, and the situation will certainly present itself in such a way that all of a sudden we'll realize that we're not meeting our technical goals and responsibilities because we don't have engineers, scientists, physicists, what have you. These type people are being trained in Japan and Germany and France, other areas of the world, and we'll see our technology difference, where we are the leader today, start fading from the scene.

So it's important that hearings like this take the steps necessary and various legislative movements be studied and looked at in order to make sure that we can maintain our technological advances through the interest of education for math and science here in this country.

Thank you, Mr. Chairman.

Mr. **Valentine**. Thank you, sir.

The gentleman from Arkansas, Mr. Ray Thornton.

Mr. **Thornton**. Thank you, Mr. Chairman.

Let me congratulate you, sir, for scheduling this important set of hearings and for your leadership in working on the National Competitive Industry Work Force Act which will be introduced soon. I also would like to congratulate our colleague, Honorable David Price, for his leadership in bringing forward to us his bill to establish programs at the NSF for the advancement of technical education.

We have a rare opportunity at this time in history, where the pressures of the threat of a land war in Europe with the massive forces of the Soviet Union has diminished, to redirect our resources to assure that our Nation enters the next century not only militarily strong and economically powerful, but also the greatest country on earth in terms of its attention to human qualities—education, the opportunities for freedom, and responsibility—that have made our Nation great.

I've been calling for a "Marshall Plan for America" as appropriate to our needs today as the Marshall Plan was in rebuilding Europe after World War II, and certainly education is such an investment. It is a mistake to think that rebuilding infrastructure, whether human resources or material resources, is a current expense.

When you build an airplane runway, you're building for 50 years in the future. When you build a system of roads and highways, you're building for 50 years in the future. When you encourage investment in new technology, in tools, in plants to keep up with the rapid change so that our inventive genius can be harnessed to the marketplace, you're talking about an investment in the future. And when you talk about preparing young men and women and a work force that needs to change its skills to meet its opportunities for new employment, you're not talking about a current year's expense; you're talking about an investment for a future generation.

And it is that kind of investment that this committee has made, under your leadership, Mr. Chairman; bringing great emphasis upon, and I want to congratulate you, sir, for scheduling these hearings and for providing us the leadership that you are doing.

I also want to welcome our witnesses. Dr. Luther Williams, who will be on the second panel, is a longtime friend of mine, and I'm looking forward to our colleague David Price's testimony and then to Dr. Williams' testimony.

Thank you, sir.

Mr. **Valentine**. Thank you, Mr. Thornton.

We will welcome to the table the first panel, which consists of our distinguished colleague, Honorable David Price from the 4th District of North Carolina.

David, we are glad to have you here and happy to receive your pearls of wisdom.

STATEMENT OF HON. DAVID E. PRICE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NORTH CAROLINA

Mr. **Price**. Thank you, Mr. Chairman. I'm grateful for the opportunity to be here and to testify on my bill, H.R. 2936, the Technical Education and Training Act of 1991, before this subcommittee. This brings back the many good memories I have of serving on the Science Committee for the past four years.

I especially appreciate the help you, Mr. Chairman, have given me on this and other legislation. You have been a leader in ensuring that our Nation is equipped to take on the economic challenges of the future, and we are lucky to have you at the helm of this important subcommittee at this critical time.

I also appreciate the support of the Ranking Republican Member, Tom Lewis. He's an original cosponsor of H.R. 2936 and is recognized by all of us here as a strong advocate for education. We're lucky to have Ray Thornton on this subcommittee, a man with a strong educational background and commitment. It makes me feel better knowing that Ray will be casting his expert eye on this particular bill.

I also want to mention my appreciation for the support that Chairman George Brown has given this bill, as well as Rick Boucher, the Chairman of the Science Subcommittee.

H.R. 2936, the Technical Education and Training Act of 1991, will substantially upgrade our educational and training efforts in science, mathematics, and technology to ensure that our work force has the skills to remain competitive in the global economy. The need for this legislation has been well-documented. Already, three out of four new jobs in America require education or training beyond a high school degree. It's no longer just a question of whether Johnny can read or write. It's a question of whether Johnny can read a technical manual and understand it well enough to get a job at IBM.

This situation is especially critical in the South. A Sun Belt Institute report examining work force literacy efforts in the south, entitled "Work Force Literacy in the South," published a couple of years ago, found that our region is particulary at risk of creating a permanent, massive pool of undereducated citizens. These workers are unable to support themselves in a primary labor market at a time when shortages of skilled workers are emerging as a critical barrier to general economic progress. In other words, there's a serious and growing mismatch between what the workplace requires and what our young people and our adult workers are bringing to the workplace.

The Federal response to this challenge has been, to be charitable, inadequate. Again, using the South as a reference, Federal efforts in adult education have served less than five percent of the undereducated population in the South, and these Federal efforts are usually concentrated in teaching basic skills rather than meeting job or occupational requirements.

As Eric Bloch, former director of the National Science Foundation, acknowledged before this committee in 1990—and you may, Mr. Chairman, remember that exchange in this room in Spring a year ago—we asked Mr. Bloch what was falling through the cracks, what were the major gaps in our Federal education and training effort, and he said advanced technical training is falling through the cracks.

There is plenty of support for Director Bloch's contention. Our Sun Belt Institute study concluded "that Federal programs should aim to help adult education programs transcend their emphasis on general education and their historic isolation and to overcome their lack of resources and expertise to address the literacy demands of the workplace."

My legislation responds to this critical challenge by directing the National Science Foundation to establish a competitive grants program for Associate degree colleges to provide technical training and education in advanced technology fields. Awardees would be expected to develop and disseminate model instructional programs, to enter into innovative partnerships with the private sector and Government agencies, to improve faculty competence in advanced technology fields, and to upgrade instructional equipment. These types of programs have worked well in my State of North Carolina.

As you know, Mr. Chairman, from field hearings in our part of the State, private businesses and community colleges have joined together to educate and train workers. This training has taken place both at the work site and at the colleges. This kind of flexibility has benefitted the college faculty, the students, and the businesses involved. Instructors have gotten a firsthand look at new industrial processes, students have been able to upgrade their skills, and businesses have enhanced the quality of their work force.

This bill would also establish 10 National Centers of Technical Education and Training. Five would be Associate degree-granting colleges with exceptional advanced technical training programs, and five institutions would be institutions that excelled in science and math education. The idea would not be just to upgrade these 10 institutions, although we would surely do that, but beyond that, we would use them as clearinghouses for institutions across the country which are trying to improve their education and training programs.

This bill is designed to take advantage of the fact that many community colleges are already actively involved in training programs. Federal assistance in taking these programs to new levels of excellence and effectiveness and then in disseminating the models and the methods across the country would be a wise investment.

The National Science Foundation's well-established role in improving education, especially in advanced technology fields, makes this agency's leadership in this kind of training and education development particularly appropriate. Furthermore, the Foundation will ignore our national deficiency in advanced technical training at its own risk. Our Nation's leadership in science and engineering cannot be sustained unless it's supported by the best-trained technicians in the world. The research enterprise in this country depends on improving the skills of these workers, and the success of NSF-sponsored research will be dependent on our success in upgrading the skills and training of our Nation's work force.

The final part of this legislation directs the director of NSF to establish a program of outreach and partnership grants between Associate degree colleges and four-year academic institutions to increase the number of students achieving Bachelor's degrees in math, science, engineering, and technology. These grants will allow these institutions to facilitate the transfer of talented students who might otherwise stop at the Associate degree level by providing special counseling and academic advising, workshops, tours, and summer programs for these students.

In closing, Mr. Chairman, I want to stress that our Nation's deficiencies in work force training are shutting the doors of opportunity on thousands of our citizens and are sapping our competitiveness. Good workers in my State and other States face unnecessary hardship because their skills have not kept pace with technological change. Plants have closed in rural areas throughout this country because workers lack needed skills, and there's no way for them to acquire them. And high-tech businesses in areas like North Carolina's Research Triangle Park complain about the jobs that remain unfilled because of the lack of skilled workers.

We're failing our Nation's citizens and we're sacrificing our economic future if we do not confront the needs of our work force directly.

So I commend you for holding this important hearing focusing attention on this problem and on potential remedies, and I look forward to working with you in developing legislative initiatives to address this problem.

Thank you.

Mr. VALENTINE. Thank you, Mr. Price. Do you have any estimate as to the initial appropriation that would be necessary to get a program as envisioned by your legislation off the ground and started?

Mr. PRICE. The estimate we have of the total appropriation that would get this launched, assuming enactment of all the titles, would be in the range of $45 million to $50 million, which, of course, is a good deal of money, but as these programs go, not a very large outlay.

Let me say that our approach here is fitted to the NSF's mode of operation. This is not a large grant program. It's not a large grant and aid program. It's a program that would set up prototype curricula and teaching methods and set up a few centers of excellence, the idea being that the results and the models could then be disseminated. They would have a ripple effect throughout the country.

It's not a huge new grant-in-aid program. It's designed, though, to move us ahead in developing these curricula, these teaching methods, these model programs so that we're not reinventing the wheel in every State, in every community, in every community college system, but we're setting up these prototypes which can then be replicated throughout the country. So for a relatively small investment, I think we would have a relatively large effect.

Mr. VALENTINE. Do you envision the Federal Government's participation in this area as a way to attract the attention of State Governments? Would this money be used on a matching basis? Or do you envision a situation where the National Science Foundation would make direct grants where, in their opinion, need existed?

Mr. PRICE. In every case, there would be matching funds. We would require that the funds be matched from other sources, and we're looking at this not as an area that Federal Government would preempt or would take over, but an area where the Federal Government would play a catalytic role. With a relatively modest investment of seed money, we think we could make many good things happen.

Mr. VALENTINE. So where an area, a State exhibited sufficient interest to put up the local money, they could attract Federal money, which would be a great advantage. On the other hand, where there was a lack of local initiative, the funds might not be available.

Mr. PRICE. That's absolutely right. This is not going to happen without local initiative. Fortunately, I think there's a great deal of potential initiative out there.

We've seen that in our own State, some of the pioneering programs that have been begun in cooperation with industry. The Tech Prep Program, which is, of course, the new feature of our vocational education efforts, was pioneered in North Carolina. We've seen enough in our State to know that the need is there and that the initiative is there to respond to this need, but we do need a push, we need some resources, and we think this bill, in a modest way but in an important way, would help get us moving.

Mr. VALENTINE. I don't have any other questions. I will yield to other Members of the Committee, but before I do that, let me say again how much we appreciate the effort which you have put into a solution of this problem and presenting this legislation to the Committee. Let me also say for the record that I believe you to be unusually well-prepared to advise us in matters of this kind by virtue of your service on the faculty of Duke University in your other life. That difficulty being balanced by your residency in Chapel Hill, I might say.

[Laughter.]

Mr. **Valentine**. I yield to my distinguished colleague from Florida.

Mr. **Lewis**. Well, thank you, Mr. Chairman. I just want to—I have no questions. I want to congratulate the gentleman for the inspiration behind the legislation. He knows what is needed, and I don't know of anyone, as the Chairman has indicated, more qualified to follow this through the legislative process. I believe that it's important that someone with the educational background and the relationship with education that Mr. Price has moves ahead and cannot be sidetracked when he knows that the importance of the legislation comes first and the balance comes second. So I do congratulate the gentleman for his work.

Mr. **Price**. Thank you, Mr. Lewis. I'm grateful for your interest and support and that of Mr. Boehlert and other Republican Members. This is a totally bipartisan, nonpartisan issue. You know, sometimes people wonder what comes out of the hearings and the studies that we do around here. This is an example, I think, of how hearings and investigations of a problem can lead to some realistic remedies.

We commissioned the Sun Belt Institute study, we had Science Committee hearings in North Carolina, we had legislation last year, some of which was enacted as part of the science and math education bill of last year. What we've done is taken the advanced technical training portions that were not enacted, we've refined them, improved them further. We think we have a first-rate piece of legislation that draws in a very tangible way on the study and the work that we've done here, and I think the time is now to move ahead with it.

Mr. **Valentine**. The gentleman from Arkansas, Mr. Thornton?

Mr. **Thornton**. I would just like to again congratulate you on your leadership in bringing this forward and to refer for a moment to the splendid example that has been set by the Research Triangle as to the impact upon solid educational and research programs on nurturing an environment in which people can have great opportunities. I think this builds on that experience and expands it to include a great number of people who are not able to benefit from the collegiate-level training. Is that your intention, sir?

Mr. **Price**. That's exactly our intention. We, of course, do a good job in our State and across the country with classic engineering education, and we're doing a better job, I think, with vocational education. But there's a huge and growing gap between those two, this area that we call advanced technical training, and that's where we're falling behind.

You mentioned the Research Triangle. I remember very well the hearings that this committee had there soon after I came to the Congress, and I remember the head of the largest firm in the Research Triangle said to us, "I can see the day coming when I will not have a single job for a person without at least two years beyond high school."

Mr. **Thornton**. Yes.

Mr. **Price**. That caught me up short, and I think it caught a lot of the Committee Members up short and underscored just exactly how serious this problem is. It's, of course, a matter of opening up opportunities to thousands of individuals, but it's also a matter of keeping our country moving—

Mr. **Thornton**. Absolutely.

Mr. **Price**.—and keeping the South moving along on a healthy path of economic growth.

Mr. **Thornton**. And we will not be the only country traveling this path, because I believe we find some of our economic competitors already working maybe a bit more advanced than we are in this area of technical training and partnerships between industry and workers. Certainly Germany and Japan provide their high school graduates with a better benchmark from which to move than we do in this country. Is that not correct, sir?

Mr. **Price**. Absolutely. We have some catching up to do, and I think it's time that we fully enlist the National Science Foundation, which is so well-equipped to offer this kind of development program, enlist them fully in this effort.

Mr. **Thornton**. Again, congratulations on your leadership. I would like to join as a cosponsor of your bill.

Mr. **Price**. Thank you. We'll sign you up. I'm grateful for that.

Mr. **Valentine**. The Chair recognizes at this time the gentleman from California, Mr. Rohrabacher.

Mr. **Rohrabacher**. Could you let me know how much money we're talking about?

Mr. **Price**. Yes. Before you came in, we said that the authorization level for this bill is around $40 million to $50 million annually. In other words, it's not a large grant and aid program. It rather aims at the development of prototype programs, following the general NSF mode of operation.

Mr. **Rohrabacher**. So it would be $40 million to $50 million, and who would be the recipients of the $40 million to $50 million?

Mr. **Price**. There are three main titles in the bill. The main recipients would be two-year institutions, Associate degree-granting institutions, who would always put up matching funds from other sources, but they would apply for Federal funds to develop prototype curricula, teaching methods, partnerships with businesses, faculty development programs, all attempting to set a standard, a new standard, in advanced technical training.

And as I stressed earlier, the idea would be not just to upgrade those institutions, but to have a ripple effect on the whole system. In other words, the criterion would be, will this advance our abilities in this area in a way that other institutions can then pick up and benefit from?

Mr. **Rohrabacher**. So the $40 million to $50 million would go into a pool, which would then be drawn upon by different junior colleges and such from around the country who come up with specific program requests? Is that it?

Mr. **Price**. Well, the program would be administered by the National Science Foundation—

Mr. **Rohrabacher**. Yes.

Mr. **Price**.—and there would be three components to this. The first is a grant-in-aid program for specific projects of the sort I just mentioned, the second would be the development of these 10 centers of excellence, 10 National Centers of Technical Education and Training—

Mr. ROHRABACHER. And those would—

Mr. PRICE.—and then the third would be, I would assume, somewhat smaller grants to aid in the transition of particularly promising students from community colleges into four-year institutions.

Mr. ROHRABACHER. Would the 10 centers of excellence that you're talking about, would they actually be directly offering a service to young people who are trying to be trained or other people who are being trained?

Mr. PRICE. Yes. We would not envision any new—this is not bricks-and-mortar money. This does not set up new centers. All of these would be existing institutions already engaged in teaching and training. I would think our strongest institutions would be the ones we would fund in this way, because, as I said, this is not a general assistance program for community colleges. This is a program designed to develop centers of excellence, to develop the very best in a way that then the whole system can benefit from.

Mr. ROHRABACHER. The centers of excellence would be offering their service to people, or they would be offering plans for other institutions?

Mr. PRICE. They would be offering, in the first instance, services to students. They're all teaching institutions, and we're upgrading their teaching and training programs. This, then, could be replicated, could be copied, emulated by other institutions. But, no, these are not think tanks operating in isolation somewhere. These are ongoing academic programs which we want to make the very best in the world.

Mr. ROHRABACHER. So of the $40 million or $50 million, you're not talking about a significant sum that is being used by education experts in order to write new plans, which will then be read by other education experts who then will also write plans in the future, who will also write plans?

Mr. PRICE. As far as I'm concerned, none of the money would be used for that sort of activity. What we're talking about is the improvement of institutions and programs that have already proved their excellence and that we think can do even better and can serve as models for others.

Mr. ROHRABACHER. Could you give me an example—

I'm sorry I'm late, Mr. Chairman. We're all pretty busy around here, and I apologize if I'm asking a question that's repetitive.

Mr. VALENTINE. No, you don't need to apologize. I want to say that the Chair and others are gratified by so many members coming in here since there are no votes this afternoon.

Mr. ROHRABACHER. Yes, sir.

Mr. VALENTINE. So you're welcome to proceed. Take whatever time you need, within reason.

[Laughter.]

Mr. ROHRABACHER. Thank you, Mr. Chairman.

Could you give me an example of a specific individual who you envision as participating in the system? I mean, there is an individual outside the education institution. If you could just—John Doe or whoever it is—tell me who he is and what you see. How is he going to be treated? How is the money going to be spent in helping John Doe?

Mr. **Price**. The typical program I would envision in this way. Let's imagine that a plant is operating in a given area that is utilizing advanced robotic technology, and this plant is highly mechanized, but it needs some well-trained technicians to operate and to maintain that equipment, and these are not skills that are to be found very easily in the existing work force. So I would presume that a local community college that already has a strong technical training program under way would be encouraged by the availability of this support to develop a truly exemplary program in robotics, to undertake some faculty training, to establish a partnership with that industry, and to perhaps enlarge the available slots to students who want to study in that area.

So some Federal support on a matching basis would be available for that community college to develop that course, and so the beneficiary ultimately would be John Doe, the student who maybe is already employed by this firm or maybe is not, but who, in any case, is ambitious enough to want to upgrade his skills and to master this field. So he would be the one who was pulled into this program and who was ultimately benefitted.

The other beneficiaries, I think, would be other community colleges in the system and around the country who eventually could replicate and copy this program. But in the first instance, we're talking about a program that's up and running and that would be upgraded by virtue of this support.

Mr. **Rohrabacher**. Thank you very much.

Thank you, Mr. Chairman.

Mr. **Valentine**. Thank you, sir.

The Chair is happy to recognize at this time a new Member of the Subcommittee, a new Member of the Congress, and to again welcome him here with us, the gentleman from Massachusetts, Mr. John Olver.

Mr. **Olver**. Thank you very much, Mr. Chairman.

I was trying to think whether I really had anything to say since I came in so very late here in the process, but, Mr. Price, do you have an example in the Research Triangle area of the kind of partnership between two-year colleges and four-year colleges that is embodied in I guess it's the Title III of the legislation, the Associate Degree-Granting College/University Partnership, that is working in the way that you would like to see it work?

Mr. **Price**. We have a good many examples of the kinds of projects envisioned in the earlier titles of the bill. We have less going in the way of systematic efforts to identify promising students and move them on into four-year programs. That does go on on individual campuses, and there are success stories of people who were spotted at the community college level and who, one way or another, made their way to North Carolina State or their other institutions. But we do not do that very systematically or very effectively in our State, and I think we don't do it very well across the country. But there may be systems—California comes to mind—where there is a more systematic effort, as I understand it.

But it's something we need to attend to, and this is a new title in this bill. It's something that we've added after widespread consultations. We think a modest set of incentive grants in this area would be of considerable help to community college systems, and we think we need to put some emphasis in this area.

Mr. Olver. Does this also envision the possibility that you could have a community college or two community colleges working with University of North Carolina and Duke University — one public, one private—in a consortium that would all be part of an NSF granting process for part of Title III I guess that would be?

Mr. Price. I would think that would often be the form it would take, some kind of cooperative arrangement, a joint application between a community college system or specific community colleges perhaps with a specified four-year institution that would facilitate the movement of students, promising students, from one to the other. Yes, I think I could envision it taking that form very easily. I think it would be very hard for a single community college to carry out such a program in isolation.

Mr. Olver. It's interesting. I have—in my area, there are a large number of plastics industries and a large number of paper industries, and in part, they do overlap a little bit because a good many of the paper companies actually are in processed paper, converted papers, which involves some degree of plastics involvement, and I had been thinking about how to get the community colleges which have some capacities to do job training working with the universities in the area which are both public and private and have very good programs in industrial engineering or polymer engineering or mechanical engineering, say, to provide what each could do best as an institution, as an educational institution, for the benefit of those industries which have a much broader scope.

And so this, it seems to me, is headed in the right direction, and if I may ask your permission, I think I'll follow my colleague from Arkansas and ask to cosponsor the legislation, as we may have a groundswell of cosponsors here out of this hearing.

Mr. Price. Good. We'll gladly add your name, and I think we do have a growing list of cosponsors and a very high- quality list, so we look forward to working with you on this.

Mr. Olver. Thank you.

Mr. Valentine. The Chair recognizes at this time the lady from Maryland, Ms. Morella.

Mrs. Morella. Thank you. Thanks, Mr. Chairman.

It's delightful to see you David. As somebody who spent 15 years teaching at a community college, I realize the value of education given not only at community colleges, but other colleges that offer the two-year degree, and of course, Work Force 2000 indicates that we will have a real sparsity of people entering the work force who are prepared in the technology area, and especially a great number of women and minorities who will be entering the work force, and I imagine that you envision these grants that will be given to these colleges through NSF will also have some special direction toward women and minorities. Is this something that is encompassed within the concept of the bill, David?

Mr. Price. It's something certainly that we would anticipate and would envision and would think within the NSF's mission that that kind of emphasis would be made. If there needs to be specific language to that effect, we would certainly welcome that. I think it's striking how many women in particular are coming to these community colleges, often after having a couple of children, coming in their 30s and early 40s for training.

In conjunction with developing this bill and introducing it, I recently toured Wake Technical College in my district, and the student body president there, I think, is fairly typical of the kind of students we're increasingly seeing. She was a mother of two children who had had what she saw as inadequately challenging jobs early on, and she was now back at the community college taking a very ambitious program and doing very well and certainly very enthusiastic for the kind of training she was getting there.

This is a changed student body that we're dealing with, people coming in from all kinds of unconventional backgrounds and all kinds of career paths, and this kind of training would open up doors of opportunity, I think, to these people in an important way.

Mrs. **Morella**. Great. I'd like to give you a chance, without belaboring the point, to respond to what we may hear in later testimony. You know, I've always felt that when you're like the first witness, everybody fires questions at you, but you never have a chance to come back later to respond to something that someone else may say and you were dying to have that opportunity, and I'm just wondering how the Administration feels about your bill, and secondly, how does NSF feel about the bill? If there are any comments you want to make on it.

Mr. **Price**. Well, as I came into the room today, I saw that there were some negative comments in the NSF testimony about the bill. They're very low-key and, I think, not fully developed, so I'll be interested to carry on that conversation. Let me just say a couple of quick things in response.

First of all, this legislation deals with a gap that was — before you came in, we were talking about the testimony of Eric Bloch, you remember, a little over a year ago in this very room, where he identified advanced technical training as an area that NSF was making some efforts in. He was talking about some work with community colleges, but his basic testimony was that this was falling through the cracks, that the work force demands in this area were greatly increasing, that the growing area between classical science and math and engineering education on the one hand and traditional vocational education on the other. There's a huge area there that is more and more important to our country and that we're really not doing the training job we should be, and he testified to that effect, and this bill responds directly to that need.

Now, you might say, is NSF the agency to do the job? And I think this is a need that certainly other agencies, the Education Department in particular, must respond to as well, and indeed, with our new vocational education programs, we are doing some of that. But this is a program, a bill designed specifically to fit NSF's mode of operation and NSF's capacities.

It's not a huge new grant-in-aid effort. It's an effort to provide some seed money for the development of prototype curricula, state-of-the-art teaching methods, model partnerships with industry, faculty training—the kinds of things that NSF does best and has done with great success in a number of educational areas. We need to apply that expertise, apply those models to this area of advanced technical training, because I think by so doing, we can engage some of our Nation's best talent in this program and then create a ripple effect throughout the entire community college system.

Mrs. **Morella**. And you're not asking for that much. What is it, $500,000? But that you feel would be seed money.

Mr. **Price**. Well, the total amount for all of the titles of this bill would be in the $40 million to $50 million a year range, which, of course, is a substantial amount of money, but compared to other programs—

Mrs. **Morella**. Where did I get that figure of $500,000?

Mr. **Price**.—compared to other programs, it's a rather modest outlay. It's one that I think would have substantial ripple effects.

Yes, the individual grants would be limited to $500,000 each, which is a point worth underscoring, I suppose, that we're not talking about huge outlays to any one institution; we're talking about matching funds that we think would provide substantial incentives but certainly wouldn't be a bonanza for any one institution.

Mrs. **Morella**. But looking at it that way, you know, that's significant, so you certainly could move forward on it. Well, fine. Thank you very much, David. I appreciate your leadership in this regard and the leadership of our Chairman.

Thank you, Mr. Chairman.

Mr. **Price**. Thank you.

Mr. **Valentine**. Thank you.

The Chair recognizes the gentleman from Florida, Mr. Jim Bacchus.

Mr. **Bacchus**. Thank you, Mr. Chairman.

Mr. Chairman, I'd like to congratulate Mr. Price on his outstanding testimony. I would sign up as a cosponsor of his bill today, but I'm already a cosponsor of his bill.

[Laughter.]

Mr. **Bacchus**. As far as I'm concerned, it is by far one of the most significant bills pending before the Congress. I think that Mr. Price said it correctly when he said that a lot of people are falling through the cracks. There are several points that I'd like to emphasize that he's already made, but I would like to underscore them.

I serve also on the Science Subcommittee, and those of you who serve with me on that subcommittee as well know that I have repeatedly, since my arrival here, encouraged the National Science Foundation to direct more of its energies, more of its efforts, and more of its dollars to community colleges, and frankly I've been pleased recently with the responsiveness that I have received from the NSF.

For example, I met with some of their people and our State Commissioner of Education in my office a few weeks ago. The State of Florida has a new grant to improve science and math education. Florida is the pilot project, and the NSF, with our help, has discovered that 80 percent of those who teach public schools in Florida first attend a community college before going on to a university, so they're directing their energies toward the community colleges, and I like this part of the bill, because it's the community colleges that are in need of this technical assistance and this training.

Second, I like the fact that it doesn't attempt to resolve all our problems here in Washington. It doesn't say how these things necessarily need to be done in a Washington way. It encourages creativity in the community, in the neighborhoods, at the grass roots. I'll give you one example of something in my district that's already happening and that I believe that enactment of this bill into law would encourage.

I was at the plant of Rockwell Corporation in my district a few weeks ago. Rockwell does a lot of work on the Space Program—the Kennedy Space Center is in my district, as many of you know—and right there in Rockwell's plant was an instructor from the community college. He was spending six weeks there studying what they do at Rockwell, because he also teaches his students at the community college how to do the technical kinds of things that Rockwell needs to have done, and that particular community college, Brevard Community College, is collocated with a campus of the University of Central Florida, and they work together and together with the private sector on this technical training. That's the kind of thing that I believe Mr. Price is trying to encourage and his bill would encourage. That's the kind of thing we need to do.

Finally, and perhaps most significantly, I believe that this is an active affirmation, it's a positive contribution we could make to the right kind of change that's needed in our economy. Too often these days in America we seem to fear the future. We're apprehensive about it. We think we're going in the wrong way economically or we're frightened of the changes in the world economy, and so we tend not to make the changes that we perhaps ought to make.

We tend to be too protectionist, we tend to be too reactionary, we tend to inhibit change, but America has been about change, and we've been successful because we've been on the cutting edge of change throughout our history, and I believe that a bill such as this, by enabling our workers to get the skills they need to have in order to compete in this new world in which we find ourselves, will help us stop fearing change. It will help us seize the future and shape it in ways in which we can have a better share of success and prosperity, and I congratulate Mr. Price on his bill. I have no questions.

Mr. **Price**. Thank you.

Mr. **Valentine**. Thank you, sir.

The Chair recognizes at this time the distinguished lady from Missouri, Ms. Horn.

Ms. **Horn**. Well, thank you, Mr. Chair, and since I've just arrived, I won't presume to ask any questions of my distinguished colleagues, either one, from North Carolina here. I just do want to say, though, that I think this is certainly an area in which we need to do everything we possibly can in this country to encourage this, and I am looking forward to learning more about Congressman Price's bill and how we might help.

Thank you.

Mr. **Price**. Thank you very much.

Mr. **Valentine**. Thank you.

Thank you, Mr. Price. If you have nothing else to say, we'll move on to the next panel. We appreciate your sharing this testimony with us.

Mr. **Price**. Thank you.

Mr. **Valentine**. Panel number two consists of Dr. Luther S. Williams, Assistant Director for Education and Human Resources at the National Science Foundation.

Dr. Williams, your statement will appear in the record as presented to us. If you could favor the Subcommittee by giving us a shorter rendition, summarizing, we would appreciate that.

Could you let me see if we need to get you either closer to the equipment or the equipment closer to you, or turn it on, maybe.

Mr. **Williams**. The equipment is fine.

[Laughter.]

STATEMENT OF LUTHER S. WILLIAMS, ASSISTANT DIRECTOR FOR EDUCATION AND HUMAN RESOURCES, NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C.

Mr. **Williams**. The Committee's concern for issues of technical education, work force training, and the U.S. industrial competitiveness is both timely and critical. I would like to start my comments by stating the Foundation's views on the bill.

I believe that such additional legislative authority is not needed by the National Science Foundation, and we suggest that a narrow, targeted effort could come at the expense of a more broad existing program that would—under which one could give proper attention to technical education.

Let me translate that. My comment does not speak to the merit of the three major components, the programmatic elements of the bill, but whether in fact the Foundation requires it in order to mount a substantial program in this area, and the rest of my testimony is designed to try and address that point. In part, it will draw on a description of what in fact the Foundation is currently doing in this area, and I will concede that in the instance of two-year institutions, it's of comparatively recent vintage—a couple of fiscal years.

This committee has recognized the need for increased emphasis on technology and science education at two-year colleges. This is entirely appropriate and is consistent with NSF's overall efforts in science, math, technology education, the broad issue of literacy and capabilities for all students. Clearly an important role, a comparatively unique role, to be played in the instance of technical education resides with the two-year institutions. It is appropriate, therefore, for NSF, with a major commitment to undergraduate education in science, engineering, mathematics, technology, to give its attention to improving the qualification of technologists and production workers, which, of course, is the objective of the bill.

All of American colleges and universities are called on to respond to the needs for an ever-changing population and workplace, but it is the two-year colleges that are ideally positioned to serve as the catalyst for improving post- secondary education required to meet the demands of the levels and the kinds of technical education now being required by industrial staff in the production phase of a competitive cycle.

NSF intends to play a major role in strengthening math and science programs at two-year colleges. This strengthening will yield what I term a "triple dividend," the first, and to be sure, graduates of such advanced technology programs will be ready and appropriately trained to embark immediately on careers in the industrial work force. But many other students in such programs will continue their education by appropriate articulation between two-year institutions and Bachelor degree-granting institutions in science, engineering, and technology. And still others will acquire useful skills and familiarity with sciences and mathematics.

And I might observe that one could extend this beyond three categories, and the observation you've already heard with respect to the original collegiate origin of a substantial fraction of the individuals who are professionals in the K-12 work force. They originate their education in two-year institutions.

These institutions obviously are an important resource for all of the reasons you have stated. They address an increasingly diverse student body not only in terms of individuals presently underrepresented in science and technology, but, if you will, nontraditional—at least, by our historic references—in terms of individuals making the transition into education late into their career.

The problems I would submit that attend two-year colleges are roughly comparable to those that attend undergraduate institutions, four-year schools. The question is the specificity of the programs to address their needs, and those general problems are as follows: keeping the faculty up to date in their fields; developing courses that will effectively track and retain—I emphasize retain—the students in the degree programs; the development of laboratory components for the instructional effort, and that's especially important in technology education, where one desires the student's experiences and skill acquisitions to be consistent with the instrumentation they will confront in the work force; making sure that there's an effective articulation between high school—I emphasize high school—and the two-year community college, meaning the quality of the educational sequence in high school in math and science and the educational effort in the first two years of the community college sequence; and lastly, the articulation between two- and four-year institutions, particularly in terms of comparability of course work, credits, the transfer of those credits, and the use of technology.

NSF in fact has programs that cover all of those broad areas. They are—we have a program, as you're aware, in instrumentation and laboratory improvement designed to broadly provide state-of-the-art instrumentation in colleges and universities, and it includes, for fiscal year 1989, 53 grants to two-year colleges. We have a program that addresses the broad issue of the intellectual—enhancing the intellectual rigor, the contemporariness, state-of-the-art of the knowledge base of faculty, called Undergraduate Faculty Enhancement, and there are several grants to two-year institutions.

In the broad issue of the curriculum, materials development or instructional materials, we have a comprehensive program that deals with courses and curricula in engineering, in mathematics, and, broader, the sciences, and obviously if one were to extend that to include, as has been cited in Representative Price's bill, specific areas in advanced technology, most of which can be accommodated under the broad rubric of engineering, informational, and computational sciences, we have the mechanism, we have the existent program to do comprehensive course and curriculum development.

In addition, to promote student interest in technical education from high school to college, we operate a program for young scholars, high-ability high school students, and a component of that is actually targeted toward technical education. In fact, several community colleges hold such grants.

We have a robust private sector partnership program that is also spoken to in the bill. Under this program, we make grants to stimulate the provision of intellectual capital that comes from the industrial sector to work in collaboration with colleges and universities, or, for that matter, school districts, to create a consortium in order to promote input from those important sectors into the programs of the colleges.

In recent time, "recent" meaning the last year or so, the Foundation has given an awful lot of time to its responsibilities and role vis-a-vis two-year institutions. I fully agree, since reference was made to the observation, to the comment made by former director of NSF, Eric Bloch, within the continuum of our portfolio, most assuredly technical education—advanced technical education, to be precise— and, in particular, the needs of two-year institutions are not well-served.

In order to try to enhance our programs, we held a workshop in May of this year, drawing broadly on the membership of the two-year college community, and basically asked that group, after a two-day session, to give us its recommendations of how best the Foundation could enhance its programs. We also have had a several-year interaction with the American Association of Community and Junior Colleges, with roughly the same goal. The recommendations that emerged that match very well with our current initiatives are as follows for the two-year institutions.

Critical need is for curriculum reform and program improvement, making sure, as is suggested under the center component of the bill, that one has a comprehensive instructional material development process and that can be modeled and replicated and implemented in a variety of institutional settings. The urgent need is for providing professional development and renewal opportunities for the faculty of all such institutions. If that's the general problem in a four-year institution, most assuredly it attends in the case of two-year colleges.

To accommodate the increasingly diverse student body, some of which academic preparation from the high school sector is problematic, it is an advantage that the Foundation has a very active precollege—especially the high school component — math/science education program that essentially examines every facet of the enterprise, because an awful lot of the knowledge, experience, and programs in that sector could be effectively applied in enhancing the preparation and the readiness of the students who enroll in two-year colleges.

The need for partnership strategies to expand the linkages between high schools and two-year institutions and between two-year institutions and four-year schools, as well as alliances between two-year colleges, the private business sector, and industry.

Overall, we commend the subcommittee for its efforts to stimulate improvement of technological literacy and competences in this country. NSF fully supports the finding of H.R. 2396, which states, "The improvement of our work force productivity and our international competitive position depends on substantially upgrading and coordination of our educational efforts in science, mathematics, and technology, especially at the Associate degree level."

The earlier section of my testimony was to show that the Foundation is convinced of the important role played by the two-year colleges in the education of the Nation's undergraduates and the responsiveness of community, junior, and technical institutions as a choice of substantial fractions of students and the need of NSF to be responsive to it.

In the aggregate, our response, then, based on the advice received from a broad canvassing of the community, is as follows: to strengthen curricula at two-year institutions to provide professional development and renewal opportunities for the faculty; to assist two-year institutions and high schools in development articulations and partnership strategies; and to draw on the resources in the business and industrial sector for the benefit of these institutions. All of these efforts will redound to the benefits of persons who are enrolled in technical training programs, to be sure, but they will also address the improvement of institutional quality in the broadest and most fundamental ways, and that will be to the benefit of any student enrolled in a two-year institution.

It is for these reasons, as well as the fact, as I observed earlier, that in our view additional authority is not needed, that the Foundation suggests that it's possible to address the needs spoken to under the broad rubric of increased emphasis—properly so—increased emphasis on technical education under our existing programs.

Mr. Chairman, I appreciate the opportunity you have given me to appear at this important hearing, and I have offered a record of my written statement elaborated on here.

Thank you.

[The prepared statement of Mr. Williams follows:]

DR. LUTHER S. WILLIAMS
ASSISTANT DIRECTOR FOR EDUCATION AND HUMAN RESOURCES
HEARING BEFORE THE
SUBCOMMITTEE ON TECHNOLOGY AND COMPETITIVENESS
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES
SEPTEMBER 17, 1991

Mr. Chairman, this Committee has recognized the need for increased emphasis on technology and science education at the two-year college. Currently, the National Science Foundation (NSF) is studying many aspects of its role in improving the science, mathematics, and technology literacy and capability of ALL students; one of the most important of these aspects is helping two-year colleges improve the quality of their instruction so as to increase their effectiveness in developing the capabilities of their students -- who are the nation's citizenry, in general, and its technical workforce, in particular

In May of this year, as one step in this process, the NSF sponsored "The National Science Foundation Workshop on Science, Engineering, and Mathematics Education in Two-Year Colleges." Much of what I have to say today proceeds from the reports of that and similar NSF workshops and from a status report on the same topic prepared by American Association of Community and Junior Colleges (AACJC) with NSF support.

The National Science Foundation's programs in both education and research have made major contributions to the efforts that result in the production of highly skilled scientists and engineers by American schools, colleges, and universities. Many of these programs contribute also to the early education of successful business managers and financial experts. It is not inappropriate that NSF play a role in improving the qualifications of America's technologists and production workers.

It is clear that the nation's vision must be enlarged to include sound scientific, mathematical, and technical education for ALL students, especially for those who will enter the critical segment of the workforce that handles the production phase of the competitive cycle. It is on these men and women that responsibility falls to maintain the efficiency and quality in producing the goods and services that compete effectively in the international marketplace.

The effectiveness with which the schools and colleges of the nation prepare its workforce in science, mathematics, engineering, and technology relates directly and immediately to its economic, political, and intellectual health. In the precollege arena, there are many signs that the mathematics and science communities have begun to take seriously their roles to advance the science, mathematics, and technical literacy and capability of ALL students.

This Committee has been very supportive of NSF's proposals at the precollege level.

The National Science Foundation believes that its capabilities and resources are best employed in efforts to improve the broad and general technical skills, the competencies, called for in reports such as that of the Secretary's Commission on Achieving Necessary Skills for America 2000 (SCANS), rather than in supporting improvements in training students for specific jobs which may have a short lifespan.

A large and ever-increasing fraction of industrial and institutional jobs now require some significant postsecondary education; traditional skills are no longer sufficient to meet the demands of the workplace. Today's worker (and certainly tomorrow's) must have not only broad and serviceable basic skills but advanced thinking and problem-solving skills as well. Equally important, today's worker must exhibit such personal qualities as a well-developed sense of responsibility, the ability to participate in team efforts, firm self-esteem, and demonstrable success in self-management.

While all of America's colleges and universities are called upon to respond to the needs of an ever-changing population and workplace, its two-year colleges are ideally positioned to serve as catalysts for improving the postsecondary education required to meet the demands of the levels and kinds of technical education now being required by industry. Increasingly, the two-year colleges play a significant role in the early collegiate training of higher level scientists and engineers because they address the educational needs of the whole of America's diverse population.

NSF has a role to play in strengthening the science and mathematics programs at two-year colleges which are essential elements of high quality technology education and technician training. Such strengthening will yield double dividends: many graduates of such programs will be ready to embark immediately on careers in the industrial workforce; and, many others will continue their education in pursuit of baccalaureate degrees in science, engineering, and technology.

TWO-YEAR COLLEGES AS A RESOURCE

There are over 1400 two-year colleges in the United States -- 70 percent public and 30 percent private; together they enroll nearly 5 million students. Their student bodies contain over half of the minorities in higher education and about 40 percent of all college students. While these institutions serve a variety of purposes for students, they all have a single dominant mission -- instruction.

Two-year colleges bring important strengths to the development of the nation's human resources for learning and work in science, mathematics and technology:

- they provide access to higher education for many who might not otherwise have such opportunities;
- they support a great diversity of learning purposes and related environments ranging from personal growth and career-oriented courses, through academic remediation and numerous technical education curricula, to courses constituting the first two-years of work for students who will transfer to four-year colleges and universities; and,
- they enroll very large numbers of minority and low-income students.

The two-year colleges play three important roles that are important in a climate of changing demographics and workplace needs:

(1) They supply a large number of technologists who enter the job market directly from an associate degree or certificate program.

(2) They send a large number of qualified, motivated, and successful transfer students to four-year colleges and universities. (The majority of students who chose teaching as a career use this route and meet their science and mathematics requirements in the two-year college.)

(3) They take their service to their surrounding communities seriously -- by offering a wide variety of courses designed to help the workforce upgrade and renew job skills and develop new skills. (In a typical night class at a community college, more than half the class might already have four-year degrees. They return because their jobs demand new skills.)

There are important reasons why the two-year college is the college of choice for many students, including minorities. Two-year colleges can help students who are academically underprepared to begin college work. Because two-year schools are in the communities where students live, costs of attendance are usually considerably less than at four-year institutions, and propinquity permits students to combine work and study; often, such schools are the only financially viable option for many first-time and most non-traditional students. Finally, students attend two-year colleges because of the quality of the instruction, wide variety of programs, and support services offered.

Problems in science, engineering, mathematics, and technologies education at two-year colleges are analogous to those of many four-year institutions: keeping faculty up-to-date in their fields; developing courses of study that attract and retain students, particularly minorities and women; developing the laboratory component of science, engineering, mathematics, and technology programs particularly in these times of limited available resources; and making sure that there is a strong articulation program between high schools and colleges in science, mathematics, and technology. Very importantly, there is also a need to improve the interface between two and four-year schools in terms of course development, transfer of students, and use of technology.

Limited professional development opportunities, heavy teaching loads as well as committee and departmental assignments, lack of emphasis on research, and often small numbers of faculty members in a particular scientific department keep many two-year college faculty in isolation from the mainstream of their science, mathematics, engineering, and technology disciplines. Faculty often lack the time, funds, and access to collegial interactions necessary to develop scholarly pursuits which would keep them attuned to new discoveries in their disciplines as well as new ways of teaching and learning which are changing rapidly due to instructional technology, an emphasis on applied problems, and a changing population who have been shown to learn in qualitatively different ways from traditional groups.

The staff at NSF, particularly in the Directorate of Education and Human Resources (EHR), is aware of and sensitive to the situation faced by two-year college faculty. Teachers at two-year colleges have little experience or tradition developing proposals such as NSF requires in it merit-based review processes. This is not surprising given the mission of two-year colleges, the work load of the faculty, and the lack of institutional support.

The recent workshop we sponsored addressed how not only NSF, but also two-year college faculty, professional organizations, two-year college presidents and administrators, local and state funding agencies, and other federal agencies, can work together to increase the role that two-year colleges play in improving science, engineering, mathematics, and technology education at all levels. The report will be published shortly, and we will share it with you. NSF has also been working extensively with the American Association of Community and Junior Colleges (AACJC) and discipline-based community college groups in mathematics, science, engineering, and technologies. Outreach activities have had the dual goal of better acquainting faculty with available NSF programs and improving the understanding of NSF with regard to two-year colleges. Together this now forms a basis for NSF to use to work with faculty and administrators in two-year colleges as programs are developed to improve the quality of educational activities in

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science, engineering, mathematics, and technologies. Already the number of projects in two-year colleges and technology education is increasing.

NSF has directly and quickly responded to many of the recommendations of this 1991 workshop. These activities and programs are based on a systematic approach to analysis of the nature, goals, and needs of two-year colleges and are being developed in coordination with AACJC and discipline based professional organizations. In just the last month, NSF has entered into a project with AACJC to create a cadre of "NSF-AACJC Fellows" whereby two-year college faculty will serve as program officers in all five divisions of EHR. The Education and Human Resources Advisory Committee, which I head, has just added two members from two-year colleges.

The National Science Foundation - A Targeted Role

The appropriate role for the National Science Foundation is one of intellectual and substantive leadership. The Foundation is able to draw upon its position in the science, engineering, and mathematics education and research communities to provide leadership, developmental support, and intellectual resources to strengthen two-year college science, engineering, mathematics, and technology and the preparation of students graduating from high school. The Foundation's leadership will be most effective in making sure that the quality of funded programs is consistent with sound scientific and engineering principles.

The NSF fully understands the Committee's desire to support programs that will lead to a more technologically capable workforce. Immediate attention needs to be drawn to the issues which most dramatically affect the quality of instruction and instructional programs in science, engineering, mathematics, and technology. Two-year colleges are ideally positioned to serve as catalysts for educational improvement and to address the national concern for literacy. The two-year college specifically provides for accessibility, comprehensive services, and for quality undergraduate education, making it an effective agent for change.

NSF is focusing on five key areas. These areas are curricular reform and program improvement; professional development and renewal opportunities for faculty; the increasingly diverse and often academically unprepared student population; partnership strategies that would expand linkages with elementary and secondary education as well as four-year colleges and universities; and the need for active alliances among two-year colleges, private sector business, and industry. The Foundation has broad program authority for activities in these areas. Several of our current efforts at two year colleges are highlighted in the additional material submitted for the record.

Comments on the Technical Education and Training Act of 1991

The Chairman should be commended for his concern for the improvement of technological literacy and competency in the United States. NSF fully supports the findings in HR 2936 which states "the improvement of our workforce's productivity and our international economic position depend upon the substantial upgrading and coordination of our educational efforts in science, mathematics, and technology, especially at the associate-degree level." We at NSF affirm the important role that two-year colleges play in the education of the nation's undergraduates, especially since community, junior, and technical colleges often serve as institutions of choice to minority and other underrepresented student populations.

Participants in the 1991 workshop, rather than recommending sheltered programs, clearly called for community college faculty and administrators, NSF and other national organizations, professional societies, state and local governments, secondary schools and four-year colleges and universities to work together to increase the role of community colleges in improving education in all institutions and at all levels.

It is our feeling that NSF should place its efforts on program development to provide instructional materials and teacher workshops which increase the mathematical, scientific, and technological capability for students at all levels. We want to help two-year colleges in particular to strengthen their curricular programs; to provide professional development and renewal opportunities for two-year faculty in technical, transfer, and enrichment programs; to address the diverse populations at these schools; to aid two-year, four-year, university, and high schools to develop articulation and partnership strategies; and to seek alliances between two-year schools and local businesses and industries. These programs will serve to benefit in the broadest and most fundamental way the colleges and their full population of students, not just those concentrated in technician training programs.

While NSF agrees with the intent of this legislation, NSF opposes HR 2936, because it is not necessary given our existing authority and because of its narrow focus. We believe our ongoing effort in this area ought to be broadly based along the lines that I have described. Support for narrowly targeted efforts may come at the expense of much broader and equally meritorious programs.

Appendix

Highlights of Current NSF Activities at Two-Year Colleges

A. Two-Year College Education

The Foundation is best able to focus on three areas which affect all parts of the instructional programs in science, engineering, mathematics, and technology -- faculty, curriculum, and laboratories. Programmatically, the Foundation includes two-year colleges as eligible participants in five areas: (1) faculty and teacher enhancement in content areas of science, mathematics, engineering, and technology, (2) curriculum and instructional improvement at college and precollege levels, (3) development of laboratory components of science and engineering programs, (4) young scholars, and (5) private sector partnerships.

Two-year colleges are technically eligible to receive support directly and possibly to benefit in other ways from essentially all NSF programming areas. These colleges are participating in a significant way in EHR's science and engineering programs, which are relevant to their needs, mission, and interests. However, as most NSF funds are in support of basic research, whereas the mission of two-year institutions is purely instructional, two-year colleges receive a relatively small fraction of the total NSF budget. In 1991 two-year colleges received about $3.35 million dollars of support.

At present most of NSF's two-year college support is in the Undergraduate Science, Engineering, and Mathematics Education (USEME) Division and most of the support within that division is in Instrumentation and Laboratory Improvement (ILI). The ILI program provides matching funds for laboratory equipment for college level courses. In FY91 there were a total of 84 NSF grants to two-year colleges, 71 (85%) of which were in Education and Human Resources. Of these 71, 60 were in USEME. 53 of the 84 total grants (63%) were in ILI. It is important to consider however that in addition, 19 grants were awarded to universities and other organizations through Undergraduate Faculty Enhancement (UFE) and Calculus programs totally $1.75 million which also benefit two-year college faculty. Historically, approximately twenty percent of the participants in UFE activities have been two-year college faculty.

In the College Science and Engineering Instrumentation Program (now ILI) eligibility was extended to two-year colleges beginning in FY88. The first year of eligibility yielded 39 two-year college awards totalling $1.2 million dollars. Since that time the program has grown. ILI in FY91 funded 53 two-year college projects totally $1.7 million dollars. The proposal funding rate among two-year schools has grown from 22% of the total proposals received for FY88 to 27% for FY91.

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Projects at and for the benefit of two-year colleges have also been supported in other USEME programs, in the EHR precollege improvement programs, and to a limited degree in the research directorates. Some examples of NSF funded projects in two-year colleges follow:

- **Instrumentation and Laboratory Improvement Program**

Harrisburg Area Community College in Pennsylvania is upgrading its CAD laboratory to include a network of computer workstations which support solids modeling and analysis software. Students in the mechanical engineering technology and manufacturing and design technology programs study the concepts and techniques of interactive solids modeling using this equipment.

Owens Technical College in Ohio has established a state-of-the-art Metrology Data Center. This data center enables students in the Quality Engineering Technology program to learn efficient methods of collecting plant process and quality data and to learn to use effective means of turning that mass of data into useful information for manufacturing decision making.

Parkland College in Illinois is developing new methods for teaching the non-traditional student and integrating the computer into its electronic and computer systems technology programs. These work/test stations put the student in control of a multi-media learning environment that is being matched to their learning styles.

Texas State Technical Institute is preparing specialized electronic-electromechanical technicians for the continuous and batch manufacturing industries using specialized laboratory equipment. The intent of the laboratory is to leapfrog the gap between current state-of-the-art training facilities and industrial needs through the integration of an entire control system.

- **Private Sector Partnerships**

Alabama Aviation and Technical College and Northwest Airlines in partnership are developing a program to support the improvement of mathematics education in aviation technology programs. The goals of the project are to strength the mathematics component of the aviation technology programs offered at the school by the design, development, pilot-testing, and revision of three new courses in collaboration with avionics engineers and by exposing students in their avionics programs to the real workplace. Special emphasis in the program is on increasing the opportunities for women and minorities in aviation technical education.

At Lewis and Clark Community College in Illinois the project "Math, Science, and Technology Education for Riverbend in the 90s" aims to enhance math and science education for non-baccalaureate bound students in community college preparatory programs and career programs in grades 6-12. The project will help prepare students for technical careers. Current applications of science and mathematics will be integrated into the curricula.

Harry S. Truman of the City Colleges of Chicago is conducting a project for Biotechnician Training. This project will develop a two-year curriculum leading to an associate degree in technology, prepare students for employment as biotechnicians, and increase the representation of minority and disadvantaged populations in science and math technology. Harry Truman College also has a Young Scholars Program using the topic of Chicago as an ecosystem designed to acquaint inner city youth with the technical systems in the community.

- **Undergraduate Faculty Enhancement Program**

Prince George's Community College of Largo, Maryland conducted a six day workshop for community college faculty to learn about the Chesapeake Bay ecology at the University of Maryland Chesapeake Bay Biological Laboratory. Lectures, field work, and laboratory work were included.

Texas A & M has designed a model for the utilization of cooperative relationships between university professors and two-year college faculty members to provide professional inservice enrichment training for two-year college physics teachers. The program focuses on recent developments in physics, innovative physics teaching methods, and successful techniques for recruiting local minority students into two-year college science and engineering programs.

- **Undergraduate Course and Curriculum Program**

Joliet Junior College in Illinois will conduct a one-year pilot program for experienced community college physics teachers. Hands-on workshops are planned to foster the approach of using microcomputer-based laboratories, conceptual exercises, and overview case studies. The main goal of the project is to encourage participant teachers to adapt or develop curriculum approaches which incorporate this knowledge so that students develop a stronger understanding of physics concepts.

- **Young Scholars Program**

Cuyahoga Community College in Cleveland conducted a project consisting of enrichment activities based on the "Teaching Integrated Math and Science" curriculum, research projects led by university faculty and NASA engineers and scientists, and industrial tours. This program was jointly funded by NSF, NASA, and the Ohio Board of Regents for students in grades 7 and 8.

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Emphasis was on participation by girls, minorities, and economically disadvantaged.

Northwest College in Wyoming led a program in Yellowstone National Park for students entering Grade 12. Students were exposed to various aquatic field and laboratory research paradigms, designing and choosing appropriate research methodologies as they designed and carried out an environmental study of the Gibbon River. There was an emphasis on participation by Native American students of the Rocky Mountain Region. The study also provided useful data to Yellowstone National Park research offices.

o **Calculus Program**

Union County Community College in New Jersey received a grant to implement a calculator-based calculus curriculum at five community colleges.

Suffolk Community College in New York is part of a consortium of schools including Harvard University, the University of Arizona, Colgate University, Haverford College, and others who are investigating the use of calculators and computers in opening up new topics in and new ways of teaching calculus. Emphasis in the lessons is on the "Rule of Three": when possible calculus topics should be investigated from a numerical, graphical, and algebraic standpoint.

o **Teacher Enhancement**

Blackfeet Community College in Montana is studying new methods for improving mathematics and science education for American Indian students by adapting activities to the Blackfeet culture. This multifaceted program includes community groups, local educators, and students from the community college.

Mr. **Valentine**. Thank you, Dr. Williams.

Aside from your judgment as to which agency might be best equipped and indeed qualified to administer Mr. Price's bill, H.R. 2936, if it is enacted, let me ask you to comment, if you would, on the programmatic concepts in that proposed legislation. Do you regard them as sound?

Mr. **Williams**. Yes, I regard them as sound, and as Representative Price indicated, they are structured to be consistent with how in effect NSF conducts such programs. There are basically three sections, and I'll quickly speak to them.

The Technical Education and Training Program, basically section 3, speaks to the need to develop model instructional materials and make sure that there are multiple components of that to really strengthen the overall instructional effort at the institution.

The second one speaks to centers, and that is clearly, in my judgment, a credible effort, because it would ask that all of the critical components that are important in terms of provision of quality education—faculty, instrumentation, course, and curriculum—be addressed in concert, and such centers will operate essentially in a modeling context. They would have a responsibility, as was indicated, for training the students enrolled in those institutions, but also serving as models that then would be replicated by a variety of other institutions. Thus, it would become, in my view, a very cost-effective effort.

And the last portion of the bill that speaks to the criticality of linkage between two-year institutions, in which the students receive Associate degrees, and four-year institutions is exceedingly important. So that fundamentally, the elements of the bill, in a programmatic sense, in my judgment, are sound.

Mr. **Valentine**. Dr. Williams, as you I'm sure know, many of us on this subcommittee have so much confidence in you based on your ability and experience, and we recognize problems that we encounter from the place where we sit and view things with respect to what the NSF regards as its historic and traditional mission, and we are conscious of "turf" and that sort of thing. My God, if anybody should be conscious of that, it should be the Congress.

And we come with these measures and with these ideas and with these proposals not to try to make anybody's in the bureaucracy's—if you'll pardon that expression—burden any heavier or to make things tough. We are here in this committee because we share a concern that unless we address these problems, we will have on our hands in just a few years a national disaster of the first order.

And I don't want to get back in any regionalism, and I don't want to say anything else about the State of North Carolina except to say that there exists two North Carolinas, and I suggest that that could be said about Pennsylvania, Florida, and most places. Unless we do something about that other part, we are going to find ourselves in a situation where the great, magnificent things that are created and invented and sustained by that upper one-third with the special gifts that the creator gave them cannot be sustained because there is nobody to do what is otherwise required.

So I would ask you if you would—I'm not going to ask you to take the time to do it here, but if you would fan through Mr.

Price's bill and the legislation which we have proposed and give us your best advice as to how we can address some of the problems that you're talking about and make them better, and I—

Mr. **Williams**. Mr. Chairman? Excuse me.

Mr. **Valentine**. Yes?

Mr. **Williams**. Mr. Chairman, we would be pleased to do so, but I would like to reiterate a point I made earlier. On broad program grounds, the elements that are in the bill are essentially compatible with the recommendations made to us by this broad collection of people from the two-year college community and in fact are congruent with NSF's own interests and initiatives, so there are not substantive differences, at least in terms of our view and the Congress' view with respect to the programmatic concept.

Mr. **Valentine**. Are there any specific differences, objections that you would care to discuss here, or would you feel more comfortable giving us that in writing?

Mr. **Williams**. Given that you extended the opportunity, I'll go through the bill, and we would prefer that, and then give you our opinion.

Mr. **Valentine**. All right, sir. Let me ask you one or two more short questions.

In Mr. Price's bill, he has what are called findings, or in some other documents they might be—in some other places they might be called recitations, but directing your attention specifically to number six, I'd like to ask you if, in your opinion, NSF would support that concept or that finding, which says, "The National Science Foundation's traditional role in developing modern curricula and disseminating instructional materials, enhancing faculty development, and stimulating partnerships between educational institutions and private industry makes an enlarged role for the National Science Foundation in technical education and training particularly appropriate."

Mr. **Williams**. Yes.

Mr. **Valentine**. All right, sir. I'll ask you finally, Dr. Williams, if you would direct your attention to section five of the bill, of which a preliminary draft has been presented to you, which is legislation which the Chair, with such cosponsors as it can glean, intends to introduce in the near future, and look at section five and give us your judgment as to that. That is the Statewide Technical Education and Training Networks Program. You have special expertise in this area.

Mr. **Williams**. It's extremely important, and it maps quite well with other efforts we have in this arena and, as you know, in terms of our capabilities. If, for example, the centers of excellence that were spoken to in the other bill existed, I would argue that it would be obligatory to actually have a Statewide and then, at the second level, regional network in order to promote the very best exchange of materials, in order to ensure proper dissemination.

Mr. **Valentine**. Thank you, sir.

The Chair recognizes Ms. Morella.

Mrs. **Morella**. Great. Thank you.

Dr. Williams, welcome.

Mr. **Williams**. Thank you.

Mrs. **Morella**. It's good to hear your testimony, but I'm, you know, really trying to figure it out. I mean, you said all kinds of wonderful things about what NSF is doing, and I know that you are, and I fully support the National Science Foundation.

I am remembering that you started off your testimony and you said that you did not really feel that the bill was necessary, as I recall, and then you go on to talk about how you believe in what the two-year colleges need to do and working with the two-year colleges, and you indicate also that you feel that there is special training that is needed and that when you're dealing with an instructional situation academically, not the research that NSF has been involved in, that it really does lack—the workload of the faculty and the lack of institutional support is evident and that the teachers have little experience.

Then you talk about a workshop that you had. The workshop report is not out yet, right?

Mr. **Williams**. No, it's not.

Mrs. **Morella**. It's going to be out imminently?

Mr. **Williams**. It will be out soon, and we will certainly share it with you.

Mrs. **Morella**. And what is it going to point out?

Mr. **Williams**. It speaks to essentially all of the problems you just described, that there's a major need to give attention to the faculty that work in the institutions; there are instrumentation needs; substantial attention is needed in terms of the curriculum, individual courses, the general math and science courses as well as technology; and third—lastly, fourth, to create linkages and alliances between the participating institutions.

Mrs. **Morella**. Why does NSF not want to be more involved?

Mr. **Williams**. We do very much. That's my entire testimony, except for the fact that—and this is not a detractor—our current portfolio at the undergraduate level, leaving aside whether it's the first two years of college or all four, is essentially what is called for in this bill. We have a program that focuses on faculty, courses and curriculum, instrumentation, partnerships, linkages between high schools and colleges, et cetera.

Mrs. **Morella**. How much money did you say in your appendix here that you have spent for that kind of education?

Mr. **Williams**. That's the problem. The problem is the level of the activity. The authorization, the ability to do it exists.

Mrs. **Morella**. It says, "In 1991, two-year colleges received about $3.35 million of support."

Mr. **Williams**. That's right.

Mrs. **Morella**. Yet this bill before us would allow you to enhance all of the objectives you articulated and basically to the tune of, what, $50 million a year or something like that en toto?

Mr. **Williams**. Right.

Mrs. **Morella**. So I find it difficult to understand why you wouldn't embrace it to a great degree. You say you like the concept, but you oppose the bill. That's pretty clear toward the end of your statement here. It just seems to me that anything that could be done to kind of enhance what you are doing in an area where you indicate that there is a sparsity of what's needed would be something that you would embrace. It almost sounds—

Mr. WILLIAMS. I understand.

Mrs. MORELLA. Forgive me, but it almost sounds a little elitist. [Laughter.]

Mr. WILLIAMS. No, I hope not.

Mrs. MORELLA. No, I know you don't mean it to be so, but it—

Mr. WILLIAMS. Let me perhaps personalize my response. There is no question that there is need for increased support. If the broad program outline exists, if the right limiting event is the level of support—and you made that point, we are spending $3 million or $4 million in effort that obviously requires substantially more—I would very much like to see that situation changed, and I would be supportive of any effort that would revise it and provide the resources.

Mrs. MORELLA. This bill, as I understand it, is an attempt to try to do that very thing, and perhaps, Dr. Williams, in our working with NSF, we could come up with something that we feel that you could work with. Thank you.

Thank you, Mr. Chairman.

Mr. WILLIAMS. Thank you.

Mr. VALENTINE. Thank you.

The gentleman from Arkansas, Mr. Thornton.

Mr. THORNTON. Thank you very much, Mr. Chairman.

Dr. Williams, if I knew that you were going to be at NSF and giving the kind of leadership that you will be providing and have already begun to provide, I might be disposed to think that present authority and discretion on the part of NSF is adequate, because indeed you are doing a good job. But that authority has existed for many years, hasn't it, sir?

Mr. WILLIAMS. Yes.

Mr. THORNTON. And until you came along, was there very much being done in the way of opening some doors to this kind of effort?

Mr. WILLIAMS. Well, there wasn't very much being done until recently. My being there is probably coincidental.

Mr. THORNTON. Well, there was a decision made to address these issues, and you came aboard, again, to address them, and so within the agency there is a realization now that this should become something of a priority, and some efforts are beginning to move in the direction called for by this bill. And that gets to the role of the function of this committee and of Congress in helping to establish priorities for the National Science Foundation, and I recognize that you are here to say that you have the authority, but I also hear you say you don't yet have the resources that would be needed to do a first-class job on this. Is that correct?

Mr. WILLIAMS. Yes.

Mr. THORNTON. And what we're considering here is whether you might also need the reinforcement and the direction from this committee that this committee considers this to be a very important priority for our country, and I'm just asking that you understand where we might be coming from, even though we know that you may have legislatively the authority, that we might be able to give some emphasis through legislation which could be worked out in a way that you all could become comfortable with so that you could provide even further leadership. Do you think that might be a good objective?

Mr. **Williams**. It's a good objective, and I would welcome it.

Mr. **Thornton**. I have no further questions.

Mr. **Valentine**. Thank you, sir.

Mr. Olver?

Mr. **Olver**. Thank you, Mr. Chairman.

I think maybe I have the problem following my colleague from Arkansas, but I'd like to follow up a little bit on that question. If you have the authority under present legislation to provide these kinds of outreach grants or partnership grants, say, for community colleges to work with four-year institutions, whether they be public or private, since I think we have determined that conceptually this legislation is designed to cover both, do we have any examples of grants being given to this kind of partnership between two-year and four-year schools that have presently been funded in this area?

Mr. **Williams**. Yes, we have a few—several are in my full testimony—but nowhere nearly equal to the magnitude of the effort, and they're of recent vintage.

Mr. **Olver**. And is there any separate set of guidelines or whatever for grant applications that goes out to community colleges letting them know that they may indeed vie for some particular pot of money that would fall into the categories that are envisioned by the subsections under outreach grants and partnership grants under this legislation? There is a separate set of guidelines that goes out for—

Mr. **Williams**. There aren't separate guidelines.

Mr. **Olver**.—grant applications?

Mr. **Williams**. In fact, this year, Dr. Watson, who runs the division, and his colleagues for the first time are beginning to, in writing, emphasize and encourage community colleges to make application. Your point is well-taken. Clearly we expect to increase the number of community colleges who are participating in these programs. The Foundation has a responsibility to signal the fact that we very much encourage them to make application, and we are starting it.

Mr. **Olver**. I guess if they aren't circularized in some kind of way, in a very deliberate kind of way, I'm not sure that they would know that indeed you do have the authority to provide these kinds of grants and that there was any kind of willingness on the part of NSF to embark upon this kind of endeavor, which we probably all feel is quite needed and valuable.

Mr. **Williams**. Right. Again, in agreement with you. To promote that—and it might well lead to a separate program announcement of the sort that you're describing—we had the workshop I just described, and clearly that report by NSF broadly throughout the community, enumerating the broad areas that NSF is specifically inviting the community to make application—in other words, we accepted the recommendations from the community—will be useful.

We're also doing one other thing this year. We're instituting a program deliberately in association with the, or in collaboration, rather, with the American Association of Community and Junior Colleges, where we're bringing faculty members from two-year institutions and junior colleges to the Foundation as fellows that would be in residence for a limited period of time that will work with our staff and assist them in actually formulating programs that better serve the two-year institution sector. One outcome of that effort might well be specific solicitations that speak to those communities.

But we're aware of precisely the broad issue you're describing. If we want more applicants, we've got to find more directed mechanisms to entice the community to participate.

Mr. OLVER. Would you then say that you would entertain applications in an area of cooperation between two-year and four-year institutions—

Mr. WILLIAMS. Oh, absolutely.

Mr. OLVER.—where those institutions might be some consortium of several two-year institutions with several four-year institutions, maybe even across State lines?

Mr. WILLIAMS. Yes.

Mr. OLVER. Yes, you would entertain?

Mr. WILLIAMS. And the interest would be further—

Mr. OLVER. But they really wouldn't have much way of knowing that you would entertain it unless you actually advertised that.

Mr. WILLIAMS. Well, we have a program—under the public-private sector partnership, which is one of our programs, that point is made, perhaps not with the clarity that it should. I understand your point. We very much welcome exactly the kind of consortium you describe, so we should examine our materials and make sure that we're effectively communicating them.

Mr. OLVER. Thank you.

Thank you, Mr. Chairman.

Mr. VALENTINE. Thank you, sir.

The gentleman from Florida, Mr. Bacchus?

Mr. BACCHUS. Thank you, Mr. Chairman.

Dr. Williams, I share the puzzlement of my colleagues about your testimony. Let me see if I understand what you're saying. You think you should do pretty much what this bill contemplates. You've begun to do some of it, and you're willing to concede that you should have been doing more of it sooner, but you don't want to be told to do it now, and you don't want to be told to emphasize some of it over the rest of it. Is that basically what you're telling us, sir?

Mr. WILLIAMS. Let's see. You raised five issues. Three I agree with. I'm not sure where I stopped counting.

[Laughter.]

Mr. WILLIAMS. No, it's not that I don't want to be told. I'm in broad agreement with all of the three major elements of the bill. I can cite them. The articulation between two-year and four-year institutions, under which there is consortium opportunities—

Mr. BACCHUS. So you like what the bill does—

Mr. WILLIAMS. I like what the bill does, but in fact, the Foundation can, if it had the resources, implement everything that's spoken to under the bill by our present authority.

Mr. BACCHUS. Well, let's talk about resources. We haven't gotten to that. Now, my friend Mr. Price is on the Appropriations Committee.

Mr. WILLIAMS. Yes.

Mr. BACCHUS. He left us for fairer climes. I feel certain that it's his intention, once he gets authorization for this additional money, to also seek an appropriation of additional money, and I feel certain that it's his intention not to make any other NSF programs suffer in any way as a consequence of this new initiative. Is it your fear that he will not be successful and that in being required to use $50 million for these purposes on an annual basis that you won't have $50 million to devote to other equally meritorious purposes?

Mr. WILLIAMS. The desire is—my answer will be essentially affirmative, but I'd like to state it differently.

Mr. BACCHUS. That means yes?

Mr. WILLIAMS. We have a broadly based math, science, engineering, technology education program that serves multiple outcomes—precollege math/science teachers, Bachelor's degree recipients in science and engineering, two-year college graduates, et cetera. Within our total portfolio—and I'm not arguing that overall it's adequate—there's no question that the sector that requires significant enhancement in support and attention is represented by the constituency to which this bill would speak.

Mr. BACCHUS. The community colleges—

Mr. WILLIAMS. That's right.

Mr. BACCHUS.—and technical training.

Mr. WILLIAMS. Technical training. And what I would desire obviously is a situation where that need was accommodated without doing undue damage to the existing base - -

Mr. BACCHUS. So that's your real concern. It's not the particulars of this piece of legislation.

Mr. WILLIAMS. Not the program particulars of it.

Mr. BACCHUS. It's not the program that this legislation contemplates, but it's what you might not be able to do because of money that would be siphoned away because of this program.

Mr. WILLIAMS. Because we have a multifaceted agenda, each component of which, in my opinion—

Mr. BACCHUS. Why didn't you say that in your testimony?

Mr. WILLIAMS. Well, I did in effect say that in my testimony. My testimony details all of the programs we have in place. If you sum them, they equal what in fact—

Mr. BACCHUS. No, you said it's not necessary because you have the current authority and it has too narrow a focus. That's what you said in your testimony.

Mr. WILLIAMS. True. That's part of what I said. Let me repeat my statement. I believe that such additional legislative authority is not needed by the National Science Foundation, and we suggest that a narrow, targeted effort could come at the expense of a broad existing program that assures proper attention, et cetera.

Mr. BACCHUS. Well, I misinterpreted that, because what I concluded from what you said there was that you would prefer another approach.

Mr. WILLIAMS. No.

Mr. BACCHUS. I see. I see. So the broad program that you're talking about is not an alternative way to accomplish what Mr. Price hopes to accomplish, but rather the broad panoply of the NSF's responsibilities.

Mr. WILLIAMS. That's right.

Mr. **Bacchus**. I see. Well, I hope that you will have enough confidence in us that if we pass this piece of legislation, we will also find you the dollars to pay for it. That would certainly be my intention, as I think it would be the intention other Members of this Committee.

My own view is that we need to spend substantially more in real dollars on an annual basis on the National Science Foundation and on all the programs of the NSF, and I would hope you wouldn't feel hesitant about endorsing things that are needed for the sake of our country because you think that we might shortchange some of the things that are equally needed.

Thank you, Dr. Williams, for all your hard work.

Thank you, Mr. Chairman.

Mr. **Williams**. Thank you.

Mr. **Valentine**. Thank you very much.

Doctor, just one final question, not exactly in line with what you've been asked in the past, but close to it. If NSF believes that all of the things that are suggested by the legislation introduced by Mr. Price—if you believe that there is legislative authority for you to initiate these programs, are we to assume that NSF has not moved in this direction because you did not think it was necessary to proceed with any of these programs?

Mr. **Williams**. No. In fact, the record will show that NSF's support of the two-college sector up until several years ago was minimum. Even that's an embellishment of reality. So the budget was associated with other activities. We decided that we should give increased attention to this sector, so in a proportionate but limited fashion, we began to increase the amount of funds going to the two-year college sector, but that was while maintaining everything else we were doing.

So that's why—it is not that—it was a player over the long term. It's a recent entry into the Foundation's portfolio; therefore, it is considerably underfunded relative to everything else, but certainly not owing to the fact that we didn't regard it as extremely important. And for all of the reasons you've made in your opening statement, it clearly has to be a priority.

Mr. **Valentine**. As has been stated here, we have talked in terms of percentages. We've talked about the upper third and the bottom third, the middle third maybe—I haven't heard much talk about the middle third—but we are not confronted, are we, Doctor, with a situation where the Foundation might be more concerned about that upper one-third than the bottom one-third? You know, if that's the case, you know, we need to, I think, move to correct that. We want to be sure that we address all the needs.

I, for one, believe that maybe in the past we have paid too much attention to focusing in that special area and have not used the full assets of the Federal Government to address the problems which we talk about so much today. What do you say about that?

Mr. **Williams**. Well, I think I am in agreement. Certainly if one looks over a longer time frame, yes, the support was uneven. What I mean by "longer time frame," a decade or more. But certainly in recent years the Foundation has been committed to what I would call a comprehensive agenda dealing with the total precollege, undergraduate, graduate education continuum in science, engineering, mathematics, and technology, and we have dealt with all participants, all students, replete throughout.

If there's probably one guiding circumstance for all of our programming, it's that it has to accommodate the needs of all students. There's probably no better sector that reflects that than our precollege programs, where in fact the majority of our investment, total budget, lies, and the effort there is to engage all students, not one-third upper or lower. Exactly the same thing is true in the instance of community colleges, because they're an important part of the undergraduate sector, but also they serve a critically important role in terms of citizens who participate in the institutions, but also in terms of the professionals they produce—that is, the technologists. So, no.

Mr. VALENTINE. All right, sir. Thank you very much, Doctor. We appreciate your testimony and the time that you've put into this. If you would let us have some response to the questions that we've talked about that you would mail to us, we'd appreciate it.

Mr. WILLIAMS. Thank you.

Mr. VALENTINE. So we'll receive at this time panel number three, which, as I stated initially, consists of Mr. Ira Magaziner, Chairman of the Commission on the Skills of the American Work Force from Rochester, New York; and Ms. Martha Quesada, who is a Team Member from General Maintenance, New United Motor Manufacturing, Fremont, California—if you folks would come on up and take seats as I call your names; I hope some of you are here—Dr. Anthony P. Carnevale, Vice President and Chief Economist, American Society for Training and Development, Alexandria, Virginia; Mr. James E. Schwarz, Sr., President, Omni-Circuits, Inc., Glenview, Illinois; and last but not least, Dr. David Pierce, who is President of the American Association of Community and Junior Colleges, headquartered in Washington, D.C.

Mr. CARNEVALE. Mr. Chairman, I offer Mr. Magaziner's apologies. He had to catch a plane in order to make it home before the celebration of Yom Kippur.

Mr. VALENTINE. I understand. Thank you, sir.

All right, then. If you would—I guess on my list is the—we will hear first from Ms. Quesada, and I will say to each of you, of course we appreciate your appearance here, and your prepared statements will appear in the record as presented to us, and we would appreciate it very much if you would summarize. Please proceed.

STATEMENT OF MARTHA QUESADA, TEAM MEMBER, GENERAL MAINTENANCE, NEW UNITED MOTOR MANUFACTURING, FREMONT, CALIFORNIA

Ms. QUESADA. Thank you, Mr. Chairman and honorable Members of the Subcommittee on Technology and Competitiveness.

My name is Martha Quesada. I work for New United Motors Manufacturing, Incorporated, commonly known as NUMMI. Thank you for inviting me to appear as a witness before this subcommittee.

NUMMI, which is located at the former GM facility in Fremont, California, began in 1984 as a joint venture of Toyota Motor Corporation and General Motors Corporation. NUMMI was formed initially to see if Toyota's manufacturing techniques and philosophies could be successfully implemented in the United States with union auto workers and using American suppliers.

The concepts of team work and a new approach to labor- management relations based on mutual trust and respect are what make NUMMI so innovative and exciting. The team concept at NUMMI is applied throughout the plant. It means that people work together as a team instead of as individuals. They rotate jobs, and each team member learns a variety of jobs and skills. This makes work more interesting and adds variety and flexibility.

NUMMI believes that the keys to quality and productivity include worker involvement, full utilization of team members' abilities, and the search for constant improvement. "Kaizen" is the term that we use, which means "the search for continuous improvement." It's based on a principle which encourages team members to contribute their ideas to improve every facet of our company. NUMMI believes that people who perform a job are best-equipped to find ways to improve it. NUMMI also stresses that quality should never be compromised, and team members can and do stop the production line to correct problems before they reach the next station.

The reason these concepts are so important to me personally would not be clear unless you know my personal history. I was a production worker at General Motors, Fremont, for six years, and five of those years were on the assembly line, and one year I participated in an apprenticeship program. And when the plant closed down in 1982, I was devastated.

For those of you who are unfamiliar with the auto industry, I would like to explain that an assembly line worker, under the traditional system, is usually trained to do a single repetitive job commonly found only in the auto industry.

So in 1985, when NUMMI called me to work, I was ecstatic, and working on the assembly line at NUMMI was a new experience. We were actually encouraged to learn as many jobs as we could, and after I was proficient at a particular job, I would be asked to train someone else on it. Things were not perfect, but the idea that management would actually ask for your input was fascinating to me. Training on different jobs was encouraged, unlike the old practice of sticking someone on a job for life.

After working on the assembly line at NUMMI for two years, I applied for and was accepted into a four-year apprenticeship program. The apprenticeship program at NUMMI is open to all hourly production workers, and after a series of tests and interviews administered jointly by management, the United Auto Workers Union, and the State, accepted team members begin training to become general maintenance or tool-and-die journeymen. I became a general maintenance apprentice, and at NUMMI, general maintenance workers are an integral part of NUMMI's concept of team work and constant improvement. Skilled trades team members, even when hired with a specific trade in mind, are required to participate in a continuing program of cross-training.

Consistent with NUMMI's concept of knowing all aspects of our jobs, as apprentices, we rotated through all five of our general maintenance departments plant-wide. We spent six months in each department, and we learned and became capable in the fields of electricity, machining, welding, industrial electronics, hydraulics, and pneumatics. Throughout the rotation and in each department, we apprentices were always required to work with journeymen. Without the help and the support of the journeymen, our program would not have been possible. NUMMI places a lot of emphasis on team member cross-training, and I was very fortunate to be able to work with a lot of different journeymen who had a wide range of skills.

All of this training I feel gave us a balanced view of the production system at NUMMI and prepared us to be constructive participants in that process.

There are certain key points touched on in both the Valentine and the Price bills that directly hit home with me. The Price bill mentions the technical occupational training needed to make our companies more competitive. It also mentions the emphasis on attracting men and women who are nontraditional students. The Valentine bill, as I read it, addresses the need to "explore"—and I'm quoting now— "new programs to fill training needs that currently go unmet or to serve populations currently underserved."

I am a perfect example of a nontraditional student. The training that I have received at NUMMI has in essence changed my life. I no longer worry as much as before about what would happen to me should NUMMI close down. I also feel that I contribute more to my company on a daily basis as a direct result of my training, and I look forward to the challenges that my job presents me every day. I feel that a company that holds its workers back holds itself back, and I think that at NUMMI we will continue to move forward, because NUMMI sees the importance of training.

Technical training is a part of life at NUMMI, and it gives the worker the background to make suggestions and improve our products. The end result of all of this is a more productive team member who takes pride in the quality of the product, thus increasing our competitiveness in the marketplace.

Thank you very much for the opportunity to present to you my personal views on the importance of training in the workplace.

[The prepared statement of Ms. Quesada follows:]

COMMENTS TO HOUSE SUB-COMMITTEE ON TECHNOLOGY AND COMPETITIVENESS HEARING SEPTEMBER 17, 1991

Mr. Chairman and Honorable Members of the Subcommittee on Technology and Competitiveness. My name is Martha Quesada. I work for New United Motor Manufacturing, Inc. ("NUMMI"). Thank you for inviting me to appear as a witness before this Subcommittee. I would like to mention that I am not a professional speaker. I have been an auto worker all my adult life and I never would have thought I would be testifying before Congress. But NUMMI is known for letting its team members speak for themselves, and I feel honored to be here.

NUMMI, which is located at the former GM facility in Fremont, California, began in 1984 as a joint venture of Toyota Motor Corporation and General Motors Corporation. NUMMI was formed to see if Toyota's manufacturing techniques and philosophies could be successfully implemented in the United States with union auto workers and using American suppliers.

NUMMI currently employs 3,400 team members and last month began producing light-duty Toyota trucks in addition to Chevrolet GEO Prizm and Toyota Corolla passenger cars.

The concepts of team work and a new approach to labor management relations based on mutual trust and respect are what make NUMMI so innovative and exciting. The team concept at NUMMI is applied throughout the plant. It means that people work together as a "team" instead of as individuals. They rotate jobs and each team member learns a variety of jobs and skills instead of just one job or skill. This makes work more interesting and adds variety and flexibility. It also means team members share equally in responsibilities and duties.

NUMMI believes that the keys to quality and productivity include worker involvement, full utilization of team members' abilities and the search for constant improvement.

"Kaizen," which means the search for continuous improvement, is a principle which encourages team members to contribute their ideas to improve every facet of our company. NUMMI believes that people who perform a job are best equipped to find ways to improve it.

Programs such as our team member Suggestion Program, which awards employees with coupons redeemable at local area department stores, encourage team member participation at all levels. Our team member Suggestion Program reached close to 90% participation in 1990 and generated savings of close to 1.4 million dollars.

NUMMI stresses that quality should never be compromised and team members can and do stop the production line to correct problems before they move to the next station.

The reason these concepts are so important to me would not be clear unless you know my personal history. I was a production worker at General Motors in Fremont for six years. Five of those years were on the assembly line and for one year I participated in an apprenticeship program.

When the plant closed in 1982, I was devastated. For those of you who are unfamiliar with the auto industry, I would like to explain that an assembly line worker under the traditional system was generally trained to do a single repetitive job usually specific to the auto industry.

Thus, I was one of the thousands of workers left without a job and no training or experience to prepare me for the high tech work available in our area.

Fortunately, a Federal program became available to laid off auto workers (there were tens of thousands of us across the country at the time). This program paid for a year of schooling. I went to electronics school, receiving a Technician's diploma in one year, and went to work in the electronics industry.

At that time there were many jobs available for trained technicians in the Silicon Valley, but none paid what auto workers make. So in 1985 when NUMMI called me to work, I was ecstatic.

Working on the assembly line at NUMMI was a new experience. We were actually encouraged to learn as many jobs as we could. After I was proficient at a particular job, I would be asked to train someone else on it. Things were not perfect, but the idea that management would actually ask for your input was fascinating to me. Training on different jobs was encouraged, unlike the old practice of sticking someone on the same job for life.

I was genuinely happy, but after working on the assembly line at NUMMI for two years, I applied for and was accepted into a four year apprenticeship program.

The apprenticeship program at NUMMI is open to all hourly production workers after a series of tests and interviews administered jointly by Management, the United Auto Workers' Union and the State. Accepted team members begin training to become General Maintenance or Tool and Die journeymen.

I became a General Maintenance apprentice (See Exhibit A). At NUMMI, General Maintenance workers are an integral part of NUMMI's concept of team work and constant improvement. Skilled trades team members, even when hired with a specific specialty in mind, are required to participate in a continuing program of cross training.

Consistent with NUMMI's concept of knowing all aspects of our jobs, as apprentices we rotated through all five of our General Maintenance departments plant wide. We spent six months in each department. We learned and became capable in the fields of electricity, machining, welding, industrial electronics, hydraulics and pneumatics.

At NUMMI the five departments which make up the General Maintenance section consist of:

1) Stamping: Our Stamping plant, which is brand new, is responsible for the forming of our body parts from rolls of sheet metal which go into enormous presses. In this department, I learned a lot about the preventative maintenance of the presses. I was able to do a lot of hands-on repairs to the equipment on the line. I made some electrical changes, resulting from suggestions submitted by production team members.

2) Body Shop: The Body Shop takes the formed parts from Stamping and puts the body together. In my six months in this department, I learned a tremendous amount about robotics. Our Body Shop is almost all automated and most of the welding is done by robots. I learned to take apart and repair these robots.

3) Paint: The Paint Department takes the bare metal body, puts it through an electrolytic plating bath and proceeds to paint the body through a process of sanding, priming and top coating. While I was in the Paint Department, I worked on a special projects team that was responsible for putting together a new section of an anti-chip paint booth. I was able to do a lot of electrical installation work, becoming proficient at bending conduit and wiring up electrical panels.

4) Assembly: The Assembly Department receives the painted body from the Paint Department and completes the vehicle, installing the door panels, carpets, seats, instrument panel and all the required trim. In the Assembly Department, I learned a lot about programmable controllers, motor starters and general electricity.

5) Facilities: Our Facilities Department is responsible for all the building maintenance. I learned about our compressor building which supplies high and low pressure air to the whole plant. We were responsible for all the high level lighting, the equipment in our Audit Lab, the air conditioning system throughout the plant and all the power distribution substations.

Throughout the rotation and in each department, we apprentices were always required to work with journeymen.

Without the help and support of the journeymen, our program would not have been possible. NUMMI places a lot of emphasis on team member cross training, and I was very fortunate to be able to work with a lot of different journeymen who had a wide range of skills.

Of the 32 original apprentices, as individuals we each came out with different strengths. Some excelled in machining, some loved fabricating and others specialized in electricity.

Throughout the process of classes, exams and changing departments, we met with the apprenticeship coordinator, the union skilled trades representative and our manager on a weekly basis. These meetings were mandatory for the four years and developed into an important part of our program.

The meetings provided a forum for discussion on the day-in-day-out part of our training. We were encouraged to share our problems and concerns. There were times when some apprentices felt our classroom instruction was lacking in certain areas, and I personally felt that management was very supportive and responsive to concerns, though they did not always give in to requests for change.

As apprentices, we were also required to participate in a week-long problem solving class. All NUMMI team members are encouraged to attend these classes. They consist of identifying, addressing and solving any problem, no matter how small.

All of this training gave us a balanced view of the production system at NUMMI and prepared us to be constructive participants in that process.

There were certain key points touched on in both the Valentine and Price Bills that directly hit home with me. The Price Bill mentions the technical occupational training needed to make our companies more competitive. It mentions the emphasis on attracting men and women who are non-traditional students.

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The Valentine Bill addresses the need to "explore new programs to fill training needs that currently go unmet or serve populations which are currently underserved."

I am a perfect example of a non-traditional student. The training that I have received at NUMMI has, without sounding corny, changed my life.

I no longer worry as much as before about what will happen to me should NUMMI close down. I hope that will never happen because I enjoy my job very much, but if it should, I am better prepared.

I also feel that I contribute more to my company on a daily basis as a direct result of my training. I look forward to the challenges my job presents me every day.

Now you may be thinking that I am only one person so how could training programs impact companies on a broader level.

But at NUMMI it is not just one person and it is not just the apprenticeship program. Training is open and available at all levels. Assembly workers can change departments, train for new areas, get promotions. No one has to stagnate.

I feel that a company that holds its workers back, holds itself back, and I think that at NUMMI we will continue to move forward because NUMMI sees the importance of training.

Technical training is a part of life at NUMMI. It gives the worker the background to make suggestions and improve our product. The end result of all of this is a more productive team member who takes pride in the quality of the product. This increases our competitiveness in the marketplace.

Thank you very much for the opportunity to present to you my personal views on the importance of training in the work place.

COMMENTS TO HOUSE SUB-COMMITTEE
ON TECHNOLOGY AND COMPETITIVENESS
HEARING SEPTEMBER 17, 1991

EXHIBIT A

NUMMI'S Apprenticeship Training Program

NUMMI'S Apprenticeship Training Program consists of four years of academic study - 2,000 hours, and on the job training - 6,000 hours, totaling 8,000 hours.

The program is designed to prepare apprentices to perform in a wide variety of equipment installation and repairs. This includes analyzing improperly functioning automated machinery, locating and repairing or replacing worn or damaged parts, and repairing hydraulic and pneumatic systems.

The course outline for the Apprenticeship Program is:

Blueprint Reading	80 hours
Preventative Maintenance	120 hours
Sheet Metal Fabrication	120 hours
Welding	265 hours
Machining	165 hours
Electrical	500 hours
Machine Repair	120 hours
Hydraulics and Pneumatics	130 hours
Plumbing and Pipefitting	300 hours
Basic Electronics	200 hours
	2,000 Hours Total

The schedule also includes 72 hours of safety instructio shop training.

NEW UNITED MOTOR MANUFACTURING

45500 Fremont Boulevard Fremont, CA U.S.A. 94538 (415) 498-5500

September 12, 1991

The Honorable Tim Valentine, Chairman
and Members of the Subcommittee on
Technology & Competitiveness
U. S. HOUSE OF REPRESENTATIVES
2320 Rayburn House Office Building
Washington, D. C. 20515

RE: TECHNICAL EDUCATION AND TRAINING ACT OF 1991 (H.R. 2936)
NATIONAL COMPETITIVE INDUSTRY WORKFORCE ACT OF 1991 (H.R.)

Dear Chairman Valentine and Members of the Subcommittee:

New United Motor Manufacturing, Inc. ("NUMMI") is pleased that you have extended an invitation to one of our team members, Martha Quesada, to appear before you at the hearing scheduled on September 17, 1991 regarding the proposed legislation to enact the "Technical Education and Training Act of 1991" and "National Competitive Industry Workforce Act of 1991".

NUMMI supports legislation as contained in these two bills which would establish education and training programs in high schools and community colleges with special emphasis on technical and occupational skills. As a manufacturer, we believe training in these types of advanced workplace skills is essential to America's future competitiveness in the global market place.

NUMMI supports the establishment of Youth Technical Apprenticeship Programs which provide an integrated program of classroom studies and rotational work assignments in manufacturing and technical companies through Industrial Work Programs.

The creation of instructional and on-the-job training educational systems which prepare young people for the workplace and the factory of the future is what is needed by today's youth.

BEST COPY AVAILABLE

NUMMI also believes that the establishment of American Workforce Quality Partnerships between industry and learning institutions is a desired vehicle for providing training to workers through quality programs of workplace and classroom training. NUMMI's philosophy is that training is an ever on-going developmental process for all team members.

We appreciate the opportunity to give you some insights about NUMMI through the experience of one of our team members. We have also included a brochure which provides you with some additional information about NUMMI and our history and company philosophy.

Very truly yours,

Dennis C. Cuneo
Vice President, Corporate
Planning & Legal Affairs
and Corporate Secretary

DCC/el
cc: Honorable David Price

New United Motor Manufacturing, Inc.

A Joint Venture Between

General Motors Corporation

and

Toyota Motor Corporation

March 1990

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Background

In early 1982, General Motors Corporation and Toyota Motor Corporation entered into discussions concerning a possible Joint Venture operation in the United States.

On February 17, 1983, the two firms reached an agreement in principle to produce a subcompact car at the site of a former General Motors assembly plant in Fremont, California, which had been permanently closed in 1982. The intent of the agreement was to establish an independent company which would use production concepts and techniques similar to those used by Toyota in Japan.

Both General Motors and Toyota had specific objectives in forming the Joint Venture. General Motors believed that the Joint Venture would provide a unique opportunity to gain first-hand experience with the extremely efficient and cost-effective *Toyota production system*. In addition, GM would obtain a high-quality automobile, the Nova, for its Chevrolet division.

Likewise, Toyota Motor Corporation sought to gain experience with American unionized labor and with American suppliers. By establishing a manufacturing presence in the U.S., Toyota sought to help diffuse the trade issue between the United States and Japan.

The Joint Venture was conceived as an experiment to see if Toyota's manufacturing techniques could be successfully implemented in the U.S. with a unionized work force using American suppliers to produce a high quality automobile at a competitive price.

Shortly after the initial agreement was signed the Joint Venture entered into discussions with the United Auto Workers (UAW). Discussions centered on UAW involvement in the Joint Venture and the some 5,000 GM Fremont workers who had been laid off when GM closed the plant. In September 1983, the Joint Venture and the UAW signed a "Letter of Intent" which ensured that the new company would support the unique production system to be implemented in Fremont.

Under the terms of the Letter of Intent, the Joint Venture agreed to recognize the UAW as the bargaining agent for the new employees and pay prevailing U.S. auto industry wages and benefits. The UAW agreed to the adoption of the *Toyota production system* which is based on using a team concept and broad job classifications. It was noted that as a new company, former agreements with GM would not apply. The Letter of Intent was very brief and set the stage for a formal collective bargaining agreement which was to be finalized in 1985. The Joint Venture and the UAW operated under the Letter of Intent for 22 months before the first contract was signed.

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To prepare for production start-up, actual refurbishing and construction at the Fremont facility began in September 1983. In February 1984, the Joint Venture company was formally organized as New United Motor Manufacturing, Inc.

Some $450 million were needed to prepare the plant for production which was scheduled to begin in late 1984. Under the original agreement, GM and Toyota contributed $100 million each to capitalize the new company. GM's contribution was basically the Fremont assembly plant and Toyota's was in cash. New United Motor, as an independent California corporation, raised the additional amount needed.

In March 1984, applications for employment with New United Motor were sent to approximately 5,000 former GM-Fremont employees. As part of the application the former GM employees were informed that as a new company, New United Motor would not be bound by any former agreements between GM and the UAW.

The application letter also outlined the goals and philosophies of the new company. In addition, the application underscored that it would be essential for everyone to contribute to an environment based on mutual trust, respect and cooperation if the company were to be successful. The application also noted that past mistakes such as high absenteeism and poor quality would not be tolerated by the new company. Approximately 3,000 applications were completed and returned.

Once applications were returned, New United Motor began hiring the first members of its work force. Over the next 20 months 2,200 hourly team members were hired. Over 80 percent of the original newly-hired workers were from the former GM-Fremont plant. Some 300 salaried team members were also hired.

Prior to employment at New United Motor, each hourly applicant went through a three-day assessment that consisted of production simulations, individual and group discussions as well as written tests and interviews. Newly-hired team members attended a four-day orientation program before actually starting their particular job. TheThis program consisted of classroom exercises covering such subjects as the team concept, production system, quality principles, attendance policies, safety policies, labor-management relations philosophies, housekeeping and competitive conditions in the auto industry.

Because of possible anti-trust and anti-competition implications, the U.S. Federal Trade Commissions (FTC) conducted an extensive investigation of the Joint Venture. Later characterized by FTC officials as being one of the most intensive anti-trust inquiries ever carried out by the Commission, over 40 witnesses testified or gave depositions and hundreds of thousands of documents were studied. During the hearings the Joint Venture was rigorously opposed by both Ford and Chrysler, which also filed a lawsuit to block its establishment.

Following a 15-month investigation the FTC approved the Joint Venture by a 3-2 vote in April 1984. In granting approval, the FTC stated that the Joint Venture would be pro-competitive because it would increase consumer choices while providing a beneficial learning experience for the American auto industry as well as a positive model for U.S industry in cooperative labor-management relations.

The FTC did, however, impose numerous conditions on the Joint Venture, including limiting the lifetime of the company to 12 years and restricting the number of vehicles it could produce for General Motors to 250,000 vehicles per year.

Beginning in June 1984, the first of about 450 group leaders and team leaders from New United Motor traveled to Toyota's Takaoka plant in Japan for three weeks of classroom and on-the-job training. Classroom training consisted of an introduction to the *Toyota production system,* which included the concepts of continuous improvement and quality principles. In addition, sessions were held on team building, union-management relations and safety. Classroom sessions were followed by on-the-job training in which each trainee worked side-by-side with a Toyota trainer on the Takaoka assembly line.

Assembly line training gave group and team leaders practical experience working in a production environment which would by similar to that being established in Fremont. Upon their return, they served as trainers for newly-hired team members.

In December 1984, Nova pilot production began with approximately 700 team members. For the first several months, a very limited number of cars were produced, and the Nova did not go on sale through Chevrolet dealerships until June 1985. As new team members were hired and trained in every aspect of production, production gradually increased on a weekly basis. During this period, new team members were trained by their group and team leaders and by trainers from Toyota's Takaoka plant. Full production for the first shift was reached in November 1985, 18 months after the first team members had been hired.

On April 4, 1985, Dedication Ceremonies for the New United Motor plant were held. Attending the ceremonies were: Eiji Toyoda, chairman of the board of Toyota Motor Corporation; Roger Smith, chairman of the board of General Motors Corporation; Governor George Deukmejian, Governor of California; Ambassador Nobo Matsunaga, Japanese Ambassador to the United States; Don Ephlin, vice-president, United Auto Workers; and Bruce Lee, director, UAW Region 6.

During the ceremonies, both chairmen stated that the new company was formed from a spirit of competition and cooperation to stimulate a more competitive environment and promote the development of the world's auto industry. Chairman Smith said that with the creation of New United Motor, GM, Toyota, and the UAW reached out across the seas to risk trying something new by competing through innovation, together generating the kind of changes a company must make to compete successfully in a new age of automaking.

Chairman Toyoda referred to New United Motor as a model for U.S.-Japan industrial cooperation, adding that the Joint Venture was a fusion of the best of the U.S. and Japanese automobile industries in an effort to realize an internationally superior system whose aim is to offer high quality, economical cars to U.S. customers.

New United Motor and UAW Local 2244 signed their first collective bargaining agreement in June 1985. In the agreement, both New United Motor and the UAW recognized a common goal to "build the highest quality automobile in the world at the lowest possible cost to the consumer." The contract also noted that, "we are committed to building and maintaining the most innovative and harmonious labor-management relationship in America."

Both parties committed themselves to resolving concerns through problem-solving and non-adversarial techniques and to constantly seek ways to improve quality, efficiency and the work environment. The contract also acknowledged that, "if this endeavor is to be a success, labor and management must work together as members of the same team."

A unique part of the contract was the emphasis placed on job security for all New United Motor team members. According to the contract, the company "will not lay off employees unless compelled to do so by severe economic conditions that threaten the long-term financial viability of the company."

When the Nova made its debut through Midwest Chevrolet dealerships in June 1985, New United Motor was as much a story as the Nova itself. Phrases such as "made in America with a Japanese touch," "best of both worlds" and "dual identity" were frequently used by auto writers to describe the Nova. Comparisons to various Toyota models were also made and comments like "if you've ever driven a Corolla, you'll by very much at home when you slip into the Nova" were common.

One area that most reports on the Nova mentioned was that the quality of the Nova compared favorably to products being produced in Japan. Consumer Reports commented, "we described the Toyota Corolla as the class act among small cars; it is the highest-scoring small car we've tested in recent years. The Chevrolet Nova is virtually identical to the Corolla and it is assembled, fitted and finished as well as any Toyota we've seen."

Throughout the summer of 1985, hiring for the second shift was taking place. As team members were hired, they were trained by first shift team

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members. In late October, second shift team members began gradually working on their own and by December, second shift operations were completely separate and operating as an independent shift. In April 1986, New United Motor reached full, two-shift production at 940 vehicles per day.

In May 1986, Secretary of Labor William Brock visited Fremont to announce that New United Motor had been selected as the U.S. model of labor-management cooperation which would be presented as a case study at the 1986 International Labor Organization Conference. In making his announcement, Secretary Brock stated that New United Motor serves as an example that great strides can be made in the viability of our basic industries.

Results released in June 1986 from 1986 model crash tests conducted by the National Highway Traffic Safety Administration showed that the Nova rated the best of 26 models tested. NHTSA considers a 1,000 rating as the highest possible threshold for front seat occupants in a 35 mph crash into a solid barrier. Nova scores were well below NHTSA standards at 552 for the driver and 562 for the front seat passenger.

Market conditions in 1986 necessitated a line speed reduction at New United Motor on June 30. As promised, no team members were laid off. Instead, team members displaced by the line speed reduction were given other jobs in the plant, typically involved in continual improvement teams.

On September 4, 1986, the first Toyota Corolla FX16 went on sale through Toyota dealerships. In February 1987, New United Motor produced the first Corolla FX, a base model version of the FX16 .

When the Toyota Corolla FX16 was introduced to the public, reviews were similar to that of the Nova. Automotive writers praised the vehicle, especially the 1.6 liter, 16 valve engine. Car and Driver magazine stated that "overall, the FX16 is a worthy achievement....If you're in the market for a moderately priced sporty hatchback, this car deserves your serious consideration."

In February 1987, New United Motor reached its first major production milestone of 300,000 units. In honor of the event, a cherry tree was planted in front of the facility to symbolize the growth and stability of the company. In August 1987, the 400,000th car was completed.

Market conditions that triggered the line speed reduction in 1986 again forced New United Motor to reduce line speed in 1987. Necessary changes in 1987 were distributed through the year to facilitate a smooth transition while maintaining a high-quality product. Line speed reductions were made on May 18, August 28 and November 30. New United Motor maintained its full work force through these changes without incurring any layoffs.

The first Nova Twin Cam was produced in September 1987. With the addition of the 1.6 liter, 16 valve engine for the Nova, Motor Trend magazine said, "the improvement over the standard Nova is so outstanding it's hard to believe the two had the same origin." Road and Track magazine added that "the Nova is a pleasant car, sensible and doing well on owner satisfaction surveys, and the excellent engine puts the car into the performance class, by real world feel as well as numbers."

New United Motor produced its 500,000th vehicle on April 5, 1988. To celebrate this milestone, a second cherry tree was planted in front of the plant.

Management Style

In developing the structure of the Joint Venture, Toyota Motor Corporation was given management responsibilities for the day-to-day activities of the new company. The top two positions at the company, president and executive vice president, were appointed by Toyota and filled by Toyota personnel. By design, New United Motor has implemented the Toyota management style in Fremont.

As a new, independent company, New United Motor has adopted Toyota's philosophies and concepts and has used them as a foundation for the company. Incorporated into these concepts are the best aspects of American labor and American suppliers. The end result is a truly unique management style.

The fundamental goal established by the new company is "to produce products with quality as high as anywhere in the world while ensuring that product costs are the most competitive of any manufacturer." The goal serves as the foundation for the company and all operations and decisions. The goal statement is not used as a slogan but as a philosophy supported by specific techniques and concepts as well as the manufacturing process.

To achieve the fundamental goal, basic company policies were established to set the long-term direction of the company and represent the business philosophy of management. The four basic policies established at New United Motor are:

- to foster a stable and cooperative relationship between all team members, particularly between labor and management;
- to effectively implement the philosophy that "quality should be assured in the production process itself";
- to establish long-term and stable relationships with qualified suppliers; and
- to maintain a cooperative, friendly relationship in the community and maintain a company image of being a fair employer and neighbor.

To support the fundamental goal, each year the company sets specific policies or objectives that serve as the company goals for that particular year. In establishing annual objectives, executive officers first offer an outline for the year giving a broad overview of the company's status and events that will affect operations. Functional company objectives are then established for six areas: quality, quantity, cost, human resources, communication and public policy. Each of the six areas has a responsible department that develops the objectives. However, all departments and sections have the responsibility to assist and support all areas of the company objectives.

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Each department and/or section then develops specific objectives for their area to support the company's six functional objectives for that year. Through team meetings, company-wide and by section, all team members are informed of company and section objectives.

Throughout the year, objectives are checked for progress and two formal reviews occur: once at six months, and once at the end of the year. At the end of the year, an evaluation takes place to determine the degree of achievement of objectives. This final review serves as feedback for setting objectives for the following year.

In attaining the fundamental goal of quality and cost, three basic ingredients are utilized as philosophies throughout the company:

1) Quality is assured in the production process itself, using both people and machines, so that no defects can be passed on or overlooked, resulting in a consistently high quality product;

2) Reduction of cost through continuous efforts to eliminate all waste within operations, including those that result from inefficiency or those that are not necessary; and

3) Develop team member potential through practice of mutual trust and respect and in addition:

- recognizing worth and dignity
- developing individual performance
- developing team performance
- improving the work environment.

To accomplish the fundamental goal and achieve functional objectives, the company has adopted a team concept. By design, the team concept is the key factor in the manufacturing process and not only applies to small teams in the plant, but throughout the company. Each team is responsible for performing company and section objectives in areas such as quality, cost, production and safety. For this concept to be effective, managers, engineers and other supporting staff must work closely with each team ready to give proper direction and necessary support. By management supporting the team, team members feel good about their jobs. The team concept supports the basic attitude that the company belongs to each and every team member, not just management.

An integral part of the management-style is a decision-making process based on consensus by all areas affected by the decision to be made. With this process, minor decisions are pushed down in the organization and only major and policy decisions are made by top management. By utilizing a consensus approach to decision-making, the process focuses on understanding the problem and almost always guarantees that alternatives will be considered. Once a decision is reached, implementation is easier and more efficient.

At New United Motor, the consensus process has been accomplished through simple discussions by managers involved or through a more formal process where a document is circulated. The document, referred to as a ringi-sho, contains a brief summary and cost analysis of the issue. Each department affected by the decision to be made reviews the document and may offer comments or suggestions. Once agreement is reached, each department signs the ringi-sho. The document is then reviewed by executive officers. The executive officers can offer comments or suggestions, and when they agree they also sign the document.

To support this process, emphasis is placed on the flow of information throughout the company. Various types of team meetings are held to discuss important issues to ensure two-way communication. For the consensus-style to be effective, all team members must be as knowledgeable as possible on all aspects of the company including company policies, concepts and objectives.

In addition, team members are encouraged to make decisions on their own, especially those that directly affect their area or their team. To support this activity, all team members are taught problem-solving techniques.

In problem-solving training, team members learn how to identify, analyze and solve problems logically and prevent problem recurrence. More importantly, through training, team members look at problems as opportunities to make the manufacturing process more efficient and cost-effective. Through this training, team members not only develop their skills but they also solve actual problems that exist in the work area.

A special technique referred to as the *"five whys"* is utilized by New United Motor to find the root cause of a problem. In using this technique, team members are encouraged to ask "why" up to five times or more, to investigate the cause of the problem until they determine the ultimate source of the problem. In this training, emphasis is placed on defining the question rather than just considering the answer. Once the real cause of the problem is found, then recurrence prevention can be implemented.

In summary, the management style utilized at New United Motor is based on Toyota philosophies and concepts. Even though the system has been somewhat Americanized, these basic philosophies and concepts serve as the foundation for the company. Consistency in following the fundamental goal, in decision-making and especially in the use of basic philosophies and concepts, has led to the success of New United Motor.

Production System

New United Motor utilizes a production method that is based on the philosophies and concepts that make up the *Toyota production system*. In using the Toyota system as a foundation, New United Motor has included American labor and American suppliers to create a system that is truly unique. The end result is a manufacturing and assembly process known as the *New United Motor production system*. Simply stated, the system can be defined as an integrated approach to production utilizing existing facilities, materials and labor as efficiently as possible.

The function of the system is to fulfill the company's fundamental goal of producing products with quality as high as anywhere in the world while ensuring that product costs are the most competitive of any manufacturer. The philosophy of the system is that quality should be assured in the production process itself. The system, which uses both people and machines, is such that no defects can be passed on or overlooked. The basic goal therefore is to have a consistently high-quality product produced at the lowest possible cost.

For the system to be effective and efficient, special importance is placed on three concepts: *just-in-time* production, *jidoka*, the quality principle, and full utilization of workers' abilities.

JUST-IN-TIME PRODUCTION

The philosophy behind *just-in-time* is not to sell products produced but to produce products to replenish those which have been sold. *Just-in-time* production is a concept designed to supply the right parts at exactly the right time and in exactly the right amount at every step in the production process. With this system, waste of material, waste of labor, and waste of facility are avoided and the final product can be supplied with high quality at lower costs. The system also exposes problems that may otherwise be hidden by excess inventories. In implementing *just-in-tme*, four principles are followed:

- withdrawal by subsequent process - replenishment;
- one-piece production and conveyance;
- leveling of production; and
- elimination of waste from over-producing.

The main tool used to control the production system and insure using the full capabilities of team members is *kanban*. As described by Toyota, the *kanban* procedure is simply an information system or tool that controls production and manages the *just-in-time* system.

JIDOKA - THE QUALITY PRINCIPLE

One of the basic philosophies of the company is that quality should be assured in the production process itself. The concept applied in the production system to assure quality is called *Jidoka*, the quality principle. The philosophy behind this concept is not to allow defective parts to go from one manufacturing process to the next. *Jidoka* refers to machines or the production line itself being able to stop automatically in abnormal conditions, such as when a machine breaks down or when defective items are produced. Foolproof devices on machines are a typical way to implement this system. With this system, stopping the line is applied by team members. If any team member sees a problem or spots a defective part, he/she has the obligation to quickly correct the problem, if possible, or if he/she cannot, to stop the line. By applying this concept throughout the process, each team member is responsible for quality. Quality begins and ends with every team member. Therefore, the Quality Control section is not a safety net but rather a review process. The objectives of *jidoka* are:

- 100% quality at all times;
- prevent equipment breakdowns; and
- use manpower efficiently.

FULL UTILIZATION OF WORKERS' ABILITIES

A key point in the production system is that team members are treated with consideration, respect and as professionals. As such, the system is designed to allow team members to take authority for their work. They are expected to be multi-functional and work toward the goal of using their talents to solve problems and make decisions within their group or team. To accomplish full utlization, the system has:

- eliminated waste of movement by team members;
- consideration for safety, and;
- given each team member greater responsibility.

The guiding factor behind the concept is that the team member operates the machine, the machine or assembly line does not operate the team member. Operations that are either dangerous, require hard physical labor or are monotonous and repetitive have been automated as much as possible. In many cases, team members are assigned to multiple machines or tasks. Job rotation is expected and helps to develop the multi-functional team member. In this system, team members are expected to make decisions, as in stopping the assembly line, and to participate in making improvements through new ideas and suggestions.

TECHNIQUES AND METHODS

The *New United Motor production system* is made up of many different techniques and methods to accomplish the fundamental goal of high quality and low cost. The major techniques and methods used are *kanban, production leveling, standardized work, kaizen, baka-yoke, visual control* and the *team concept.*

Kanban

Kanban is a card designed to prevent over-production and ensures that necessary parts are drawn from process to process, in reverse order. The *kanban* procedure is a replenishment system designed to control production quantities in every process. Characteristics of *kanban* are that the following process takes only what is needed when it is needed and in the amount that is needed. The preceding process produces only enough parts to replace those withdrawn by the following process. The advantage is simple but very important. Since preceding processes only produce parts in the amounts that are actually picked up for use by following processes, overproduction is prevented in all processes. The function of the *kanban* is in:

- giving work instructions;
- visually controlling production volume;
- preventing overproduction; and
- indicating problems for correction.

Production Leveling

In order to keep production costs down, it is necessary to try to produce no more vehicles and parts than can be sold. One way to accomplish this is to create a consistent production volume that averages the highest and lowest variation in orders received. With proper planning, variations can be removed from the production schedule so that the right amounts of machinery, parts and manpower can be utilized efficiently. Typically, changes in production volume tend to cause waste at the worksite. However, *production leveling* at New United Motor is not just based on total volume but

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also considers the types of cars produced, including engines and various options. *Production leveling*, therefore, is the overall averaging in the production schedule of the variety and volume of items produced in given time periods. Within the *New United Motor production system*, overall averaging of variety and volume is indispensable in securing the effects of *just-in-time*. With level production, schedules and employment remain stable. In addition, the effects carry over to relationships with suppliers in that supplier orders, production and employment are also stabilized.

Standardized Work

Each job is organized in such a manner that the sequence or procedure for accomplishing a particular job guarantees that the job is always done in the most efficient way possible, insuring consistent quality no matter who does the job. This technique is referred to as *standardized work*. By definition, *standardized work* is work done at the highest efficiency when all tasks at the worksite are organized into a perfect sequence where all waste can be eliminated. There are three goals for *standardized work:*

1) achieving high productivity;
2) achieving line balancing among all processes in terms of timing of production; and
3) elimination of excessive in-process inventories.

In standardizing work, time necessary to finish a given amount of work, order in which job steps are to be performed and parts supply on hand needed to repeatedly perform a single process are considered.

At New United Motor, *standardized work* and *standardized work* charts are the responsibility of the group leaders, team leaders and team members. Each team member is trained in standardized work processes. Each group, each team is expected to design and lay out their particular work assignments in the most efficient manner possible. As a result, there are no industrial engineers at the company.

Kaizen

Kaizen, a term used at New United Motor, means the continuous search to find waste in machinery, material, labor and methods of production and eliminating the waste by using team member ideas and suggestions. At New United Motor, each team member has the responsibility to increase his/her efficiency and productivity. To accomplish this, team members are taught to continuously search for ways to improve their operations and achieve higher efficiency, improved quality and lower costs. *Kaizen*, which is often referred to as the cornerstone of the company, is used in every aspect of the company to improve operations. Through continuous improvement, elimination of waste, unevenness and overburden, the company improves and grows and generally becomes more efficient. *Kaizen* is the key to the company fulfilling its functional goal of high quality and low cost.

The *kaizen* philosophy assumes that anything other than the minimum amount of equipment, materials, parts and labor which are absolutely necessary for production is merely surplus. In removing all waste within the system, the first step is to visually understand the process and the worksite, then separate human work from machine work. Once this is accomplished, each job or operation can be standardized and organized in the most efficient sequence. Generally, waste is referred to in seven categories: waste of correction, over production, in processing, in conveyance, of inventory, of motion and of waiting.

Baka-yoke

Simply defined, *baka-yoke* means devices on machinery that act as sensors to identify malfunctions to ensure foolproof production. These devices are used in order to improve in-process quality. *Baka-yoke* is also designed to be used as a back-up in the event of human error. The devices identify missing parts and improper assembly by rejecting the parts causing conveyors or machines to stop automatically.

Visual Control

Visual control can be defined as knowing at a glance if production activities are proceeding normally or not. *Visual control* is referred to as a tool to effectively monitor the work flow at the jobsite and includes both work by team members as well as process machinery and equipment. The intent of *visual control* is to spot problems as quickly as possible and immediately respond to those problems. The *andon signboard* is the main device used in the plant for informing supervisors that a problem has occurred. The *andon signboard* is an electrical board which lights up to show the current state of operations. If a problem does occur, the board will light up to show the location of the problem. Chimes or a musical melody are used in connection with the display light to make sure the problem is noticed and dealt with immediately. The *andon signboard* can be triggered by either a malfunction of a machine or a team member who spots a problem and either pulls a cord or pushes a button located at each worksite. In addition, *visual control* is used throughout the company in the form of various charts and graphs which display current status of quality, attendance, safety, training and other important information.

Team Concept

The *team concept* is applied not only to small teams in the plant, but throughout the company. Each team is responsible for performing company objectives in such areas as quality, production and safety. Teamwork, people working together instead of working as individuals, is the key to the concept. For the *team concept* to be effective, supervisors, engineers and other supporting staff must work closely with each team, ready to give proper direction and necessary support. Teams in the plant generally consist of six to eight team members and each team is headed by an hourly team leader. One aspect which makes the *team concept* possible is very few job classifications. This enables the use of a flexible production system while at the same time gives team members more opportunities to develop their skills and experience.

Summary

The *New United Motor production system*, based on the production system developed by Toyota, is a manufacturing and assembly process aimed at eliminating all types of waste within the production system and making it as streamlined and efficient as possible. Using a philosophy that quality should be assured in the process itself, the production system puts an emphasis on reducing costs. For the system to be effective, two concepts, *just-in-time* and *jidoka* (quality assurance) are used as the foundation. Both people and machines are considered and a special emphasis is placed on allowing team members to display their full capabilities and to make full use of their talents. The key to the success or failure of the production system is the *team concept*. By working in teams, team members are responsible for their own worksites and have responsibility for areas such as quality, production and safety.

Labor Relations

In September, 1983, the Joint Venture and the United Auto Workers finalized a Letter of Intent concerning the reopening of the Fremont facility. This Letter of Intent was a brief document which set the stage for future contract negotiations. Accordingly, both parties recognized that they were entering into a historic endeavor in the field of labor relations and that they were undertaking this new proposed relationship with "the full intention of fostering an innovative labor relations structure, minimizing the traditional adversarial roles, and emphasizing mutual trust and good faith."

The basis of the Letter was that the Joint Venture would recognize the UAW as the bargaining representative, hire a majority of the work force from the laid off GM Fremont workers and pay prevailing U.S. auto industry wages and benefits. In turn, the UAW agreed to work with the unique and flexible production system that would be established in Fremont.

The basic philosophy set forth in the Letter of Intent was that both the Joint Venture and the union would build a relationship based on mutual trust and respect. This philosophy carried over into the first collective bargaining agreement signed in June 1985: "In the administration of this agreement, and in our day-to-day relationship, we will exhibit mutual trust, understanding and sincerity, and to the fullest extent possible, will avoid confrontational tactics."

The intent of the contract was to establish a formal agreement and build upon the philosophies set forth in the Letter of Intent. While the contract between New United Motor and Local 2244 emphasized the philosophy of trust and respect, it also contained a number of concepts generally not found in most labor agreements:

1) Non-confrontational problem-resolution procedures based on discussion and consensus;
2) Relevant business issues require advance consultation with union;
3) Job security clause is the strongest in the industry;
4) A flexible attendance policy that places trust in the team member to be at work;
5) Company and union review of mitigating circumstances prior to suspension or discharge;
6) Round-table communication among all company and union leaders in all areas;
7) Minimum job classifications that provide flexibility in work; and
8) "No strike" provision over production or safety standards, allowing team members to stop the line.

The contract itself serves as the foundation for the team concept used by New United Motor. A team consists of four to eight team members in the plant led by an hourly team leader. Each team operates as a unit with responsibility for quality, production, cost and safety. Team members are expected not only to perform their particular job assignment but to be involved in all aspects of their work. Team members design their own *standardized work* and are expected to find better ways to accomplish their jobs.

While the contract provides the formal wording for management-labor relations at New United Motor, the success or failure of the relationship is based on day-to-day contact and good communication between both parties. In this regard, the human relations philosophies, concepts and policies practiced in Fremont are in reality more important than the written words of the contract.

The human relations philosophy utilized at New United Motor is that all team members are treated as equals, as professionals and as an important part of the team and company. The intent is to provide an atmosphere where everyone feels that the company does not just belong to management, but that the company belongs to each and every team member.

This philosophy is carried out to the extent that such traditional management benefits such as an executive cafeteria, reserved parking and offices are not used. These items are viewed as barriers between management and labor.

In applying this human relations philosophy to daily actitivies, four cornerstones were identified and are used as a framework from which all policies and procedures are based. The four cornerstones that set the tone for all human relations activities are:

- mutual trust and respect
- equity and fair treatment
- teamwork-team concept, and
- employee involvement.

These cornerstones provide the foundation from which group leaders base their daily activities and also create and maintain a work environment where team members know they are valued and feel like they are a part of the company. By feeling good about their jobs and being an active partner in company activities and decisions, team members at all levels take an active interest in the company's goal to produce quality products at competitive prices.

International Labor Organization Case Study

This case study was prepared cooperatively by New United Motor, the United Auto Workers and the U.S. Department of Labor for presentation to the 1986 International Labor Organization Conference.

New United Motor Manufacturing, Inc. and the United Automobile Workers: Partners in Training

INTRODUCTION

In the city of Fremont, California, some 35 miles southeast of San Francisco, sits a 3-million square foot automobile assembly facility. Closed by General Motors in 1982, it was, at one time, a vibrant, state-of-the-art plant, employing over 6,500 people and producing over 300,000 cars and trucks annually. When it was built by General Motors in 1962, the U.S. auto industry was preeminent in the world. Imports accounted for less than five percent of the U.S. market and the Japanese were struggling to sell a few thousand cars in the U.S. The Fremont plant produced its first vehicle in May 1963, reached peak employment in 1978, then began a decline which resulted in its closing in March 1982. The plant was not closed because it was technologically obsolete. GM had spent millions of dollars over the years to keep it up to date. The plant was closed because changing market conditions and its confrontational labor-management relations made it a noncompetitive plant in a market that had become increasingly competitive.

The Fremont plant suffered all the ills of the U.S. auto industry, and more. The plant was tagged as "the battleship" by its angry workers, not so much for its physical dimensions or drab color, but because of the intensity of its labor-management confrontations. During its troubled 20 years, strikes and sickouts resulted in four shutdowns. Management was perceived as authoritarian and inflexible; the United Automobile Workers (UAW) Local was perceived as militant and rowdy.

The plant had one of the worst disciplinary records in the GM system. When the plant closed, there was a backlog of over 1,000 grievances and 60 disputed firings. Absenteeism ran over 20 percent and on many occasions the plant could not start on time because not enough people had reported to work. "We'd been trained to fight with management," comments UAW Local President Tony DeJesus. "And GM's management guys were trained to fight the union. Both sides were good at it. We fought like hell."[1]

The union accused management of pushing quantity at the expense of quality; management accused labor of laziness, poor workmanship, and even sabotage. As one might expect, the plant did not excel in either productivity or quality. The Fremont plant averaged many more man-hours of labor per car than Toyota, and produced vehicles inferior in quality to those produced by Toyota.

Two years after it was closed by GM, the plant reopened under the ownership of New United Motor Manufacturing, Inc., a corporate joint venture of Toyota and GM. In the words of the UAW, the Fremont plant "has changed into a worksite unlike any other in the UAW's experiences. The members of UAW and Local 2244 actually like the place."[2] *Newsweek* magazine called New United Motor "a model of industrial tranquility."[3] Dale Buss, a *Wall Street Journal* reporter who covers the auto industry, remarked that New United Motor "has managed to convert a crew of largely middled-aged, rabble-rousing former GM workers into a crack force that is beating the bumpers off Big Three plants in efficiency and product quality."[4]

The objective facts confirm these observations. New United Motor will produce over 200,000 cars per year with approximately 2,500 white- and blue-collar workers, a level which rivals Japanese productivity. Overall attendance for 1985 was 98 percent, with less than 1/2 percent of unexcused absences. The quality of the Chevrolet Nova, the car produced by New United Motor, has been hailed by leading consumer magazines.[5] In two years, less than 20 formal grievances have been filed by the union, and all but one of these have been informally settled without resorting to arbitration. And, all of this has been accomplished with substantially the same work force that manned the GM facility when it was closed in 1982.

REASONS FOR THE JOINT VENTURE

To understand the reasons for this transformation, it is first necessary to understand the factors that led to the joint venture negotiations between GM and Toyota. In 1982, the year the joint venture negotiations between GM and Toyota began, the U.S. automobile industry, once the leader in the world, was in a crisis. Vigorous import competition and a dramatic shift in consumer preferences combined to make 1980 and 1981 two of the most difficult years in the industry's history. The U.S. automakers--GM, Ford, Chrysler, and American Motors--had just experienced collective two-year losses of over $5.5 billion. Hundreds of thousands of UAW workers were on layoff. Four out of the five auto assembly plants in California, including GM's Fremont plant, had been permanently closed. The Japanese auto manufacturers were building high-quality cars at a cost estimated by various outside sources to be $1,500-$2,000 less than their American counterparts.

The U.S. automakers faced a declining share of the world market. Labor relations were adversarial and often inflexible. Roger Smith, GM's Chairman, believed that GM had to transform its manufacturing operations to compete with the Japanese. As a model for that transformation, GM sought out a joint venture with Toyota, Japan's leading auto manufacturer.

Toyota felt the need to establish a substantial manufacturing presence in the U.S. as quickly as possible. Since its experience in overseas manufacturing was limited, the Joint Venture provided an opportunity for Toyota to learn how to work with American suppliers, workers, and their unions. Toyota's Chairman Eiji Toyoda believed that the Joint Venture would make a positive contribution to the American auto industry.

The UAW was as frustrated with its environment as the American auto manufacturers. Many of its members had lost their jobs, and future prospects were not promising. U.S. auto manufacturers were increasingly turning overseas for parts outsourcing or sourcing of completed automobiles. The two Japanese manufacturing plants in the U.S.--Nissan and Honda--were using Japanese management methods in the U.S. Neither had used these methods with a veteran and unionized work force.

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The fact that the Joint Venture sought to use Japanese management techniques with the Fremont work force caused *Fortune* magazine to remark: "As a cooperative endeavor between a symbol of Japanese efficiency and a powerful U.S. union, New United Motor is the most important labor relations experiment in the U.S. today. If Toyota can succeed in producing a car to Japanese quality standards at near-Japanese cost using unionized U.S. workers, the venture could force profound changes on the rest of the U.S. auto industry--and perhaps on other industries as well."[6]

The joint venture partners, GM and Toyota, brought in W.J. Usery, a former U.S. Secretary of Labor, to negotiate a satisfactory labor relations framework with the UAW. He negotiated with Owen Bieber, UAW President; Donald Ephlin, UAW Vice President; and Bruce Lee, Director of the UAW's Western Region. Negotiations began in May 1983 and resulted in a Letter of Intent in September 1983. Under the Letter of Intent, the Joint Venture agreed to hire a majority of its work force from the laid-off GM Fremont workers, thus enabling it to recognize the UAW as the bargaining agent for that work force. The venture partners also agreed to pay U.S. auto industry scale wages and benefits. In return, the UAW agreed that the venture was a new company not bound by the work rules and rigid job classifications of the old GM contract. The union agreed to the adoption of the *Toyota production system* with its flexible work rules and broad job classifications.

The Letter of Intent, which served as an interim agreement until a more formal collective bargaining agreement was concluded in 1985, was not a typical American labor contract. It was a concise statement of general principles, free of the usual jargon found in a labor agreement. The first page of the letter states the intent to build a new labor-management relationship: "Both parties are undertaking this new proposed relationship with the full intention of fostering an innovative labor relations structure, minimizing the traditional adversarial roles, and emphasizing mutual trust and good faith. Indeed, both parties recognize this as essential in order to facilitate the efficient production of a quality automobile at the lowest possible cost to the American consumer while at the same time providing much needed jobs at fair wages and benefits for American workers."

Five months after the Letter of Intent was signed, the Joint Venture was formally organized in February 1984, as New United Motor Manufacturing, Inc., a California corporation. While GM and Toyota are each 50 percent shareholders, Toyota was given overall management responsibility. The Chief Executive Officer is Tatsuro Toyoda, son of the founder of Toyota Motor Corporation. The Chief Operating Officer is Kan Higashi, a member of Toyota's Board of Directors. The plant is managed on the principles of the Toyota management system, which differ markedly from traditional U.S. auto plants.

An important part of that system is the cooperative relationship between management and labor and the removal of barriers between the two parties. Group leaders, New United Motor's equivalent of foremen, sit in the middle of a team room instead of in their own offices. Management roles have been redefined--from the authoritarian foreman with awesome disciplinary powers to the consensus-building group leader who gives each production-line worker the opportunity to participate in the control of the work environment. There are no time clocks at New United Motor. Everyone, from Tatsuro Toyoda, to the most recently hired team member, eats in the same cafeteria, parks in the same lot, and wears the same uniform.

The key to the system is teamwork, both literally and figuratively.

All workers have been organized into teams of 4-8 workers, or team members. Each team is led by a team leader, who is also a member of the bargaining unit, and in many instances is also the union coordinator. Each team member is trained to do every job done by the team, and jobs are rotated within the team. All production team members are covered by a single job classification;

the skilled trades are organized into three different classifications. In contrast to these four classifications, the former GM Fremont plant had 100 different classifications. Under the Toyota concept of "*kaizen*," the process of continuous improvement, each team member has a significant role in developing work standards so as to make the job safer, more efficient, and easier to do. Teams discuss work plans and decide how to redesign work operations to eliminate inefficient steps. If a team member finds that he or she cannot complete a job or that the quality of the job does not meet specifications, he or she may pull a cord to stop the production line, an act that could result in disciplinary action in other auto assembly plants. In short, each team member is treated as a full participant in the operation of the workplace.

The UAW's reasons for agreeing to the team system and workplace flexibility are summarized in the following excerpt from its *Solidarity* magazine:

"To develop fully informed workers with a broad range of skills, the UAW agreed to just one job classification for all line workers and just three for the trades. Critics say this historic reversal of protective job demarcation exposes NUMMI workers to the whims of management. But the UAW fought for the more than 100 job classifications in traditional auto assembly plants precisely because workers had no control over job content on the shop floor. At NUMMI they do. If the lone job classification is a concession to Toyota, it is even more emphatically a concession to the age-old thirst of American workers for creativity, flexibility, and a degree of job control." [7]

These concepts have enabled New United Motor to achieve a high level of productivity without sacrificing the dignity, morale, or health of its workers. The goal of high productivity has always been the goal of assembly-line operations. Too often, however, high productivity has been accomplished without the willing participation of the production-line worker. For years, auto industry managers used Frederick Taylor's "division of labor" approach in organizing the workplace. The manufacturing process was broken into its smallest components, with workers performing the same task over and over. Industrial engineers---including the time and motion people with the ubiquitous stop watches and clipboards-decided how those tasks would be performed, with little or no input from the production workers themselves.

Along with the Taylor approach went an underlying attitude that production-line workers were lazy and not very smart. Many managers shared the attitude of Henry Ford, who said at the time he announced the $5/day wage--"The assembly line is a haven for those who haven't got the brains to do anything else"--and treated production-line workers accordingly. Not surprisingly, workers have long fought against the monotony and mindless nature of traditional assembly-line work in which they were treated as so many cogs in a wheel. The inevitable result was a labor relations structure based on antagonism, confrontation, and mistrust, as typified by GM's Fremont plant.

In recent years, some American managers have begun to question whether the traditional approach to assembly-line work is the best way to operate a factory. A more enlightened view reflects the simple axiom that most people want to be productive and will produce more if they have a sense of creative involvement in their work. The success of the Japanese auto makers has definitely played a role in this shifting of attitudes. The principal reason for superior Japanese productivity is not better automation but the smarter organization of assembly jobs, the responsibility given to production-line workers, the flexibility with which those workers are deployed, and a cooperative approach to labor-management relations. The experience of New United Motor confirms this observation. With some 170 robots, New United Motor is less automated than the U.S. auto industry's newer plants. But it will produce cars at greater productivity levels. In the words of the UAW, "The key to NUMMI's high productivity is the fully informed worker, not the semi-smart machine." [8]

At New United Motor, each team member is actively involved in establishing work standards, improving productivity, and maintaining quality.

The concept of using workers as their own efficiency experts is a marked departure from traditional practices. So far, the UAW members at Fremont have accepted the idea. UAW Director Bruce Lee remarks: "I went through two Toyota assembly plants and stamping plants in Japan, and they have a fast pace. But their system is laid out so that it's easier for the workers to do the job than it is here. If you have an operation that takes you ten steps, and you can make a suggestion for a way to do it in six, you've accomplished something for the company and for yourself, even though you're moving faster. I don't think our people are going to resist that." [9]

HIRING AND TRAINING

In May 1984, New United Motor hired the first 26 of 2,150 production workers. Hiring continued for the next 20 months. The resultant work force consisted of a broad spectrum of age, gender, and national origin--as diverse as any work force in the U.S. auto industry-with some 85 percent coming from the former Fremont workers. Among the initial hires were most of the members of the former hierarchy of the UAW Local, a group not known for its harmonious relationship with the former GM management. Led by Tony DeJesus, President, and George Nano, Chairman of the Shop Committee, they played an integral role with management in starting up operations at New United Motor. They helped interview and assess the thousands of former Fremont workers that submitted job applications. They participated in giving orientation sessions and took it upon themselves to persuade the rank and file to adopt a cooperative approach with management. Their role was redefined, much in line with that envisioned by Owen Bieber, then a vice president with the UAW, in 1982, when he said:

> "The role of the union representative may have to change somewhat. Instead of being a grievance handler, he/she becomes more a knowledgeable facilitator, advisor, and educator, which is a positive change." [10]

One of the new roles assumed by Local President DeJesus, who in 1977, had led a wildcat strike at the Fremont facility, was to participate in discussions about the selection of supervisors. Said DeJesus:

> "Whoa, I thought, that's management stuff. But my wife told me that after years of complaining about supervision, I now had the chance to participate. And it was more than token participation; the union's recommendations were taken. Now, if anyone complains about a supervisor, we're partly to blame." [11]

DeJesus and the other union representatives also played an important role in training, a critical part of the start-up at New United Motor. Beginning in June 1984, some 240 production workers, including the union representatives, travelled to Japan for three weeks of classroom and on-the-job training on a Toyota production line.

The trainees were sent in groups of 32. A typical group would include group leaders, team leaders, and union representatives. The company's production managers also participated in the training in Japan. The classroom training included an introduction to the *Toyota production system*, including the concepts of *kaizen* (continuous improvement) *jidoka* (the quality principle), and *just-in-time* (the production control system). Sessions were held on team-building, quality circles, safety, union-management relationships, and the like. The classroom sessions were followed by on-the-job training in which each trainee worked side-by-side with a Toyota trainer on the Toyota assembly line.

This assembly-line training, which lasted for 2 1/2 weeks, gave each trainee practical exprience in working on the jobs that he or she would be responsible for in Fremont. But the most important part of the training in Japan was that these American auto workers were given a first-hand look at the *Toyota production system*. They were able to judge for themselves whether it could be adapted to an American auto plant. Their experiences in Japan definitely left an impression, Local President DeJesus, one of the UAW representatives trained in Japan, said of his experience in Japan:

> "The thing I was most impressed with was their human relations, their respect for one another, and how well they work with one another. If we could just apply one-half of how they treat each other, we could really improve the situation from what it used to be." [12]

Upon their return to the United States, these 240 people, including the union representatives, formed the core of trainers for newly-hired team members at Fremont. The union representatives worked with management in establishing and operating the orientation and training program for the 2,150 team members who were hired over the next 18 months. Several union representatives took full-time assignments in New United Motor's Human Resources Department to work on training and orientation.

Each team member went through a three-day assessment center and a five-day orientation program. These sessions consisted of production simulations, classroom exercises and orientation lectures on the team concept, New United Motor's production system, quality, productivity, attendance, safety, *kaizen*, housekeeping, labor-management relations, and competitive conditions in the auto industry. The classroom exercises were quite unique for production workers. For example, in one exercise individuals were grouped together as a team to build trucks out of toy blocks. In another, the team was asked to set up an assembly operation to increase productivity and eliminate unnecessary operations. These and other exercises served as a demonstrative introduction to the participatory work environment of New United Motor.

After completing the assessment/orientation program, each team member was given on-the-job training on the assembly line. For team members on the first shift, this meant a very slow production start-up. Hiring for the first shift began in May 1984. From May through December, group leaders, team leaders, and union representatives were trained in Japan. They, in turn, served as the trainers for newly-hired team members. For the first several months of production, beginning in December 1984, less than two cars a day were produced as team members painstakingly built, took apart, and rebuilt cars. During this period, team members were trained by their team leaders and group leaders. They *"kaizened"* their work tasks to improve efficiency and quality. Additional team members were added, production rates were slowly increased, and full production on the first shift was finally reached in November 1985, some 18 months after the first team members had been hired.

Hiring for the second shift did not begin until the summer of 1985, well after the first shift was operational. On-the-job training for second shift team members was accomplished by pairing team members from the second shift with the first shift. From September through October 1985, as new team members for the second shift were hired, they worked with their counterparts on the first shift. In late October, the second shift team members began working on their own--first for two hours, then for four. In December, they were totally separated from the first shift. Their training continued under the direction of the group leaders and team leaders who were promoted, after eight additional weeks of classroom training on their own time, from the first shift.

During the start-up phase of New United Motor, each team member received hundreds of hours of classroom and on-the-job training, and that training continues to this day. The overall training program is costly and time-consuming, but necessary to New United Motor's long-term goals of building a world-class quality car at a competitive cost. Traditionally, little time or effort has been put into the training of American auto workers. In the words of Joel Smith, the UAW International Representative at Fremont, "Training in the old days consisted of grabbing someone off the street, giving him a wrench and a five-minute introduction about the job, throwing him on the assembly line, and telling him to work like hell. NUMMI was a refreshing change. We at the UAW believe strongly in the importance of training, and we welcomed the opportunity to participate in the intensive training program for our members at NUMMI."

Virtually all of New United Motor's training was developed and performed in-house. With the exception of $2 million in training funds received from the State of California, New United Motor bore the entire cost of its training. By developing its own training program, New United Motor was able to tailor those programs to its particular needs.

A NEW ERA IN COLLECTIVE BARGAINING

The formal collective bargaining agreement was negotiated in mid 1985, one year after New United Motor hired its first workers. While the general framework laid out by the Letter of Intent was replaced by a more detailed contract, the collective bargaining agreement remained true to the principles of the Letter of Intent and reflected the relationship that had developed between labor and management during the year the plant was in operation.

Hailed by A. H. Raskin of the *New York Times* as an "industrial breakthrough," [13] the contract was ratified by 92 percent of the work force. According to the UAW's chief negotiator, Regional Director Bruce Lee, the agreement "meets or exceeds U.S. auto industry standards on economics, union rights, and job security, while also acknowledging the blending of industrial cultures and commitment to high-quality, efficient production."

Like the Letter of Intent, the contract bears the unmistakable influence of the cooperative labor-management philosophy at New United Motor: management accepts its responsibility of giving workers decent wages, job security and participation in decision-making; labor accepts its responsibility for promoting company productivity and growth. The contract contains a number of concepts not generally found in U.S. auto industry contracts. Among them:

- Joint union-management commitment to resolve problems through nonadversarial techniques based on consensus instead of confrontation;
- Joint union-management commitment to constantly seek improvements in quality, productivity, and cost;
- Advance union-management consultation on layoffs, production schedule changes, major investments, and other key discussions usually considered the exclusive domain of management;
- Joint union-management review of unusual or mitigating circumstances in advance of discharges or suspension of workers;
- Joint union-management resolution of problems arising from any worker's inability to meet work rates, including the right of each production-line worker to stop the production line without fear of discipline; and
- The strongest job-security protection ever given to an exisiting UAW work force, with management obliged to reduce its own salaries and bring in subcontracted work to the bargaining unit before laying off union members.

This contract symbolizes the new labor-management relationship that has been forged between New United Motor and the UAW. What distinguishes this relationship from the traditional structure is the promotion of common union-management objectives, the creation of communication channels to support these objectives, and the avoidance of adversarial solutions to problems.

For the UAW and its members, the relationship promises fair wages and benefits, job security, and participation in decisions usually the sole prerogative of management. For management, the relationship means an involved, dedicated work force, with no strikes, low absenteeism, few formal grievances, and workplace flexbility--conditions required for high productivity and high quality. From the "lose-lose" experience of confrontation, both sides are crafting a "win-win" cooperative relationship.

The contract establishes a framework necessary

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to maintain a cooperative labor-management relationship. But the words of a contract do not establish the relationship--the actions of the parties do. And the key to the success of the relationship is trust, which must be built up by practice and experience. In the words of Joel Smith, the UAW's International Representative at Fremont, "If we don't cooperate with each other, the system won't work. If it doesn't work, then stable, long-term employment is not possible."[14]

New United Motor is an experiment, closely watched by other automobile companies, unions, academia, and anyone concerned with American heavy manufacturing capability. It is a test of whether American labor, if managed and equipped properly, can compete in the world market. So far, the results are very encouraging. Naturally, some skepticism and problems remain. Twenty years of industrial strife has left its unfortunate mark on the Fremont plant. But real progress has been made. In two short years, a much maligned work force has shown that it can build cars at quality and productivity levels that rival the Japanese. An industrial battleground has been transformed into a "model of industrial tranquility." Workers and managers who have worked at NUMMI are spreading the word that cooperation between labor and management really works. George Nano, Chairman of the Shop Committee, remarks:

"We brought many groups through the plant to actually see what they have heard about. Most of the unions and management staff that have come through the plant and talked with us are encouraged by what we are doing, and leave here with a very positive attitude. They recognize that they have to change their ways of doing business and become cooperative with each other if they are going to survive in the global economy."[15]

This huge plant is once again vibrant, once again making a significant contribution to the local, state and national economy. If NUMMI succeeds, it may point the way for American labor and management to effectively compete in the world market.

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[1] Jay Stuller, "War Is Peace," *PSA Magazine*, February 1986.
[2] Jeff Stansbury, "NUMMI: A New Kind of Workplace," *Solidarity*, August 1986.
[3] George Raine, "Building Cars Japan's Way," *Newsweek*, March 31, 1986
[4] Dale Buss, "Gung Ho to Repeat Assembly-Line Errors," *The Wall Street Journal*, March 27, 1986.
[5] "Four Small Cars," *Consumer Reports*, February 1986; "Small-Car Challenge," *Popular Science*, August 1986; "Oh, What A Feeling," *Road & Track*, July 1985.
[6] Michael Brody, "Toyota Meets U.S. Auto Workers," *Fortune*, July 9, 1984.
[7] *Solidarity*, supra.
[8] *Solidarity*, supra.
[9] *Fortune*, supra.
[10] Owen Bieber, "UAW Views Circles Not Bad at All," the *Quality Circles Journal*, Vol. V3, August 1982.
[11] Henry Weinstein, "Workers Giving Good Marks to GM-Toyota," *Los Angeles Times*, December 18, 1984.
[12] *PSA Magazine*, supra.
[13] A. H. Raskin, "An Industrial Breakthrough," the *New York Times*, July 23, 1985.
[14] Paul Shinoff, "GM-Toyota Plant Breaks Detroit Mold," *The San Francisco Examiner*, December 16, 1984.
[15] Interview with George Nano, 1st Quarterly *New United Motor Magazine*.

Supplier Relations

The first step in building a quality product at New United Motor is beginning with quality parts. As a result, suppliers are viewed as an extension of the *New United Motor production system* and are considered a part of the New United Motor Team.

The relationship between New United Motor and its suppliers is founded on the principle of mutual trust and respect. Two fundamental operating principles reinforce this close relationship:

- Be positive and not fault-finding when working with suppliers; and
- The relationship is long-lasting, using a one-year contract to establish the part price.

One of the four basic company policies developed to accomplish the fundamental company goal of producing quality cars at competitive prices is to establish long-term and stable relationships with qualified suppliers. New United Motor recognizes that a successful production system requires that suppliers play a significant role in providing quality parts at a fair and reasonable cost with timely delivery. In addition, supplier attitudes toward solving problems and continued improvement are very important factors in developing and maintaining company-supplier relationships.

The Purchasing Department is the principal communication link between New United Motor and its suppliers. Buyers are encouraged to work with suppliers along with the Quality Control and Production Control departments.

Buyers at New United Motor are expected to visit each supplier's production facility twice a year. A written report is submitted after each visit. The overview typically shows process flow charts, manpower levels, problems and opportunities facing the supplier as well as a list of improvements for the plant. Purchasing management (General Manager, Manager or Coordinators) has a goal of visiting each supplier once each year.

There are three types of meetings utilized that include the company's executive staff (president, executive vice president and vice presidents) and the executive staff of suppliers. All meetings provide clear direction to the suppliers regarding the objectives of New United Motor, from a detailed part number to general operating philosophies. These meeting include:

1) **General Supplier Conference:** includes executive staff of New United Motor and suppliers, held once a year to reinforce the concepts and

philosophies of the *New United Motor production system* as well as company goals and objectives;

2) New United Motor visits: executive staffs of suppliers meet with New United Motor to discuss general topics; and

3) Supplier Visits: New United Motor executives travel to the suppliers' facility as often as schedules permit to lend support for their efforts in working with New United Motor.

Increased communication with suppliers by New United Motor team members at all levels is very important. Team members at New United Motor will lend technical and management support to suppliers when necessary in order to facilitate good communications and problem-solving. Hourly production team members often visit and communicate with suppliers to solve problems as they arise. The team member who encounters the problem with the part is given the responsibility to help solve the problem as that team member is the most familiar in working with the respective part. Team members at New United Motor commonly suggest cost-cutting measures and continual improvement ideas to suppliers to make their operations more productive and efficient. The improvements that suppliers make in their own business are ultimately reflected in the products that they provide to New United Motor.

Contracts are renewed annually with a constant effort of improving quality and cost.

The Purchasing Department of New United Motor operates under a number of policies to guide their activities with suppliers:

Purchasing Policies:

- Develop long-lasting relationships built on mutual trust with a qualified supplier base;
- Develop mutual trust through frequent, clear communications at all levels of an organization;
- Develop a qualified supplier base through clear specifications and performance standards;
- Report performance and monitor programs that support constant improvement;
- Control the number of suppliers by eliminating poor performing suppliers and increasing content of suppliers with demonstrated good performance records and experience with production system;
- Continue to develop local suppliers to provide sources close to the plant; these suppliers will be strongly considered for existing North American content as well as for new products;
- Develop sources for new products based on competitive evaluation, quality, ability to produce and attitude; and
- New business will be awarded through competitive bid process to assure maximum value to New United Motor.

Facts & Figures*

- New United Motor produced the Chevrolet Nova from 1984 until 1988. Production of the Toyota Corolla FX was from 1986 until 1988. New United Motor now produces the Geo Prizm for Chevrolet and the Toyota Corolla sedan for Toyota.
- Through early 1991 the plant will be expanded and modified in preparation for production of a Toyota light-duty pickup truck scheduled for August 1991 start-up. The overall projected cost for the new truck line is $250 million.
- The New United Motor plant is 60 acres with over three million square feet of covered space.
- The total Bay Area employment of New United Motor, its suppliers and contractors is 4,500 people.
- The total investment in the venture to date is $750,000,000.
- Annual Bay Area payroll and purchases total $300,000,000.

TEAM MEMBERS

- Approximately 2,900 team members are employed at New United Motor: 2,400 hourly and 500 salaried.
- 800 new team members will be hired in 1991 for truck production: 600 hourly and 200 salaried.
- The New United Motor team includes over 110 group leaders and 380 team leaders.
- The average size of a team is six members.
- Over 50 team rooms have been built in the plant.

PRODUCTION

- New United Motor currently has the capacity to produce approximately 220,000 vehicles per year.
- Although daily production varies, the percentage of cars produced for General Motors is 60 percent and for Toyota 40 percent.
- Roughly 1,100 vehicles are in the production process at one time.
- Each vehicle is in the production process for about 18 hours.

ASSEMBLY

- Over 3,000 parts are installed in each vehicle in Assembly.
- The final assembly line is 1.3 miles long.

PARTS & SUPPLIERS

- New United Motor uses approximately 100 North American component suppliers, 23 of which are located in California.
- Approximately 70 truck shipments arrive per day from U.S. suppliers.
- Major U.S. parts are seats, trim, tires, glass, batteries, air-conditioners, brake boosters and window regulators.
- Major Japanese parts are engines and transmissions.
- Four ships from Japan arrive at the Port of Oakland each week carrying Japanese components.
- Over 100 indirect suppliers provide construction, machinery, equipment and services to New United Motor. Most of these suppliers are located in California.

STAMPING PLANT

- The Stamping Plant houses 26 stamping presses ranging from 400 to 2,300 tons.
- The Stamping Plant produces 85 parts for New United Motor and 11 different parts for Toyota Motor Corporation in Canada.
- Stamping utilizes 315 dies and uses approximately 350,000 pounds of steel each day.

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*as of April 1990

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BODY SHOP

- The Body Shop has 210 robots which perform about 70 percent of the 3,800 welds on each vehicle.
- Approximately 95 percent of the welds on each vehicle are performed automatically.

PAINT

- A 13-stage phosphate system is used to clean and prepare each body for protective coatings.
- Each unit is dipped into a 55,000 gallon electro deposition bath, and coated inside and out for protection against corrosion.
- Each vehicle is sprayed with a color-specific prime coat.
- A total of 10 different top coat colors are applied to protect and beautify each unit. Solid colors are high solids enamel paint and metallic colors are basecoat/clearcoat enamel.

SECURITY

- The Security department employs eight in-house personnel augmented by a contract security agency. The department provides 24-hour coverage for the safety and security of New United Motor's team members and plant property.
- The Security department responds to fire and medical emergencies.

INFORMATION SYSTEMS

- Information Systems utilizes an IBM Mainframe, IBM Mini, Digital equipment computers and approximately 75 personal computers to support the data processing needs of the company.
- The software for the production control system was developed by Toyota Motor Corporation to support our "just-in-time" inventory system.

ANNUAL PRODUCTION

	Nova	Corolla FX	Geo Prizm	Toyota Corolla	Total
1985	64,766	0			64,766
1986	191,536	14,318			205,854
1987	143,652	43,726			187,378
1988	71,117	40,912	1,827	14,575	128,431
1989	0	0	112,342	80,129	192,471
1990*	0	0	16,023	17,380	33,403

MODEL YEAR PRODUCTION*

	Nova	Corolla FX	Geo Prizm	Toyota Corolla	Total
1985	27,943	0			27,943
1986	179,026	0			179,026
1987	154,895	42,480			197,375
1988	109,200	56,399			165,599
1989	0	0	83,130	69,950	153,080
1990*	0	0	46,969	89,203	136,172

*as of March 1990

Glossary

The following is a glossary of terms used at New United Motor. The terminology has been adopted from special terms used by the Toyota Motor Corporation to describe various production techniques, philosophies and concepts. Definitions of these terms were developed by Toyota.

Andon An electrical signboard which lights up to show, at a glance, the current state of work operations.

Baka-yoke *Baka-yoke* means the thoughtful use of devices or innovations, such as lights to signal the right or wrong selection of parts, in order to have "fool-proof" production. *Baka-yoke* devices help to prevent defective parts from being passed on to the next jobsite and they point out and correct mistakes.

Four S's *Seri* means clearing. *Seiton* means arrangement. *Seiketsu* means cleanliness. *Seiso* means sweeping and washing. These words emphasize the concept of keeping things under control and when put into practice, lead to neat, well-organized and clean conditions resulting in better, safer, easier and more efficient work.

Five Whys Instead of asking who, what, when, where and how to solve a problem, why, why, why, why, and why is asked to find the ultimate source of the trouble.

Group Leader A term used to identify the first line of salaried supervision at New United Motor. A group leader is responsible for all aspects of his/her group which consists of three to five teams or approximately 30 team members; one of the main responsibilities is to ensure good two-way communications between team members and managers.

Heijunka *Heijunka* means the overall averaging in the production schedule of the variety and volume of items produced in given time periods. The averaging is tied to sales.

Jidoka *Jidoka* refers to the ability of production equipment, including a single machine, to "sense" a malfunction within itself or substandard quality in the product, and to stop itself or even the whole production line. *Jidoka* also refers to workers on the final assembly line, where any worker can stop the whole line when he/she spots a defect or other problem.

Just-In-Time Is the concept of producing or conveying only those units needed, just when they are needed, in just the amount needed and at all stages of production.

Kanban *Kanban* is a small card with necessary information about parts that is the key control tool for *just-in-time* production; serves as 1) instructions for production and conveyance, 2) a check against over-production, 3) a tool for visual control and 4) a tool for improving quality processes and operations.

Kaizen *Kaizen* means the search for continuous improvement, finding waste in machinery, material, labor or methods of production and eliminating it by using worker ideas and suggestions.

Muda *Muda* means waste; those elements of production that add no value to the product and only raise costs. *Muda* is divided into seven categories: correction, over-production, processings, conveyance, inventory, motion and waiting.

Mura *Mura* means unevenness. This refers to the irregularities that sometimes happen in the production schedule or in the volume of parts or vehicles produced. Instead of remaining at set levels, volumes move temporarily up or down. For workers, it refers to workloads which vary from the standard.

Muri *Muri* means overburden. At the jobsite, this means giving too heavy a mental or physical burden to workers on the shop floor. For machinery, *muri* means trying to have equipment do more than it is normally capable of doing.

New United Motor Production System A system for automotive production by New United Motor, based on the *Toyota production system* and incorporating an American unionized workforce and American suppliers.

Orderly Pick-up Once the production sequence for models and their parts is decided, a careful schedule for moving them on to all later work stages must be drawn up. That sequence is called *orderly pick-up*.

Set-up Time This is the time it takes to change over from the instant that the processing of the last component of one type is finished to the production of the first good sample of the next type of component. It includes all the time needed for changeover of the dies, cutting tools, etc.

Standardized Work It is production done at the highest efficiency when all tasks, especially those involving people moving about, are organized into a perfect sequence where all waste can be eliminated. *Standardized work* depends on three main elements: line speed, working sequence and standardized stock in-process.

Takt Time *Takt time* is the time it takes to produce a component, or enough identical components for one vehicle. *Takt time* is figured by dividing the required total operating time by the required total production for the day. Daily operating time is figured on the basis of all machinery operating at 100 percent efficiency during regular working hours.

Team Leader The team leader is directly responsible for the performance of the individual team, which consists of between four to eight team members. Under the direction of the group leader, the team leader gives appropriate job assignments to team members and is knowledgeable about every operation within the team. The team leader is a member of the bargaining unit and an integral part of the team-building process.

Team Member A term specifically used to describe the position of production employee. Team members are responsible for all aspects of team functions such as production, quality, safety and housekeeping. The term generally refers to all employees of New United Motor.

Toyota Production System It is a manufacturing system developed by Toyota aimed at eliminating all waste and at making the production process as streamlined as possible. Besides building quality into the production process, it also puts emphasis on reducing costs.

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Visual Control A method by which managers and supervisors can tell at a glance if production activities are proceeding normally or not. *Andon* and *kanban* are typical visual control methods.

History

February 17, 1983 Toyota Motor Corporation and General Motors Corporation sign an agreement in principle to produce a small car in Fremont, California.

September 21, 1983 United Auto Workers and Joint Venture sign Letter of Intent.

February 21, 1984 New United Motor Manufacturing, Inc., officially organized as independent California corporation.

March 30, 1984 Applications sent to some 5,000 former GM-Fremont employees.

April 11, 1984 Federal Trade Commission approves Joint Venture.

June 3, 1984 First group of thirty New United Motor trainees arrives at Takaoka Plant in Toyota City for training. Over 450 group and team leaders have been trained at Toyota City.

December 10, 1984 First Chevrolet Nova pilot produced.

April 4, 1985 New United Motor officially dedicates Fremont facility.

June 13, 1985 Chevrolet Nova goes on sale through Chevrolet dealers.

June 30, 1985 First agreement between United Auto Workers Local 2244 and New United Motor signed, effective July 1, 1985.

August 28, 1985 1985 model completed, total model production: 27,943 Novas.

November 11, 1985 First shift reaches full production.

December 2, 1985 Full second shift operatings begin.

March 1, 1986 Suggestion Program established.

March 5, 1986 100,000th Nova produced at New United Motor.

April 14, 1986 Full production, both shifts, reached at 940 vehicles per day.

May 20, 1986 New United Motor selected by Department of Labor as case study on positivelabor-management relations for International Labor Organization Conference.

August 14, 1986 200,000th Nova produced at New United Motor.

August 26, 1986 1986 model completed, total model production: 179,026 Novas.

September 4, 1986 First Toyota Corolla FX16 produced at New United Motor.

October 7, 1986 Toyota Corolla FX16 goes on sale through Toyota dealers.

February 2, 1987 First Toyota Corolla FX produced.

February 23, 1987 300,000th vehicle produced at New United Motor.

July 6, 1987 New United Motor and Local 2244 begin Joint Apprenticeship Training Program.

August 20, 1987 400,000th vehicle produced at New United Motor.

August 28, 1987 1987 models completed, total model production: 197,375; 154,895 Novas, 42,480 Toyota Corolla FX.

September 2, 1987 First Chevrolet Nova Twin Cam produced.

February 23, 1988 New United Motor and Local 2244 open educational display at NewPark Mall, Newark, California.

March 7, 1988 Special '88 Training Project for all production team members begins.

April 5, 1988 500,000th vehicle produced at New United Motor.

September 12, 1988 Last Chevrolet Nova and Toyota Corolla FX produced at New United Motor.

September 26, 1988 First Corolla four-door sedan produced at New United Motor.

November 14, 1988 First Geo Prizm produced for Chevrolet.

April 25, 1989 GM, Toyota, New United Motor announced an agreement to produce Toyota pickup trucks starting in August 1991.

August 18, 1989 New United Motor sponsored an exhibit at the California State Fair in the Japan Pavilion. The exhibit focused on our California suppliers and New United Motor's economic impact within the state.

October 1989 The Smithsonian Institution in Washington, D.C. included New United Motor in an exhibit on the evolution of management.

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STATEMENT OF ANTHONY PATRICK CARNEVALE, VICE PRESIDENT AND CHIEF ECONOMIST, AMERICAN SOCIETY FOR TRAINING AND DEVELOPMENT, ALEXANDRIA, VIRGINIA

Mr. **Carnevale**. Thank you.

I'm Anthony Carnevale of the American Society for Training and Development, which is a professional society of about 50,000 human resource professionals in American workplaces, principally in the private sector. I come here today to give our enthusiastic support for both of these bills.

We like these bills for a variety of reasons. One reason is that we feel that it is important that this committee begin to deal in human resource efforts and with much the same sort of expertise and interest it does in strict technical issues. Education and training for its own sake is a good thing in an individualistic culture and a political system that worries about participation. Education has other purposes than economic purposes, but nowadays education and training for competitive purposes is more and more important, and especially in the case of technical change, focus on education and training is more and more required, we believe. And so we are thankful for the committee's interest in these issues and hope that they will continue.

We also support the bill because—the set of bills because we think they endorse a set of issues and profound changes in the American economy that all of us are going to have to deal with, changes that require that all of our institutions, from Government to the National Science Foundation to American employers, are going to have to change our perspectives and our focus somewhat. Those issues, simply put, are that in the old days it was enough to make things in higher and higher volumes and make them cheaper and cheaper and thereby win the competitive race. Nowadays that's not good enough. Nowadays, in order to compete effectively, you have to provide quality, you have to provide variety in your product, you have to customize your product, you have to provide good customer service, and you have to do all that fast, not to mention cheaply. And so we think the competitive game has changed and requires changes among all of us.

In addition to that, it is more and more clear to all of us, as Ms. Quesada alluded, that most of the changes that count in a competitive sense come in small bites, come through continuous improvements in the products and services that we make, continuous improvements in their quality and our ability to make a variety and customize in direct relationships with customers and continuous improvements with respect to the speed with which we do all that, and we know now that most of those continuous improvements come down the line in institutions at the point of production, at the point of service delivery, and at the interface with the customer, down the line where people like Ms. Quesada work.

And more and more, it's the case that that other half of our work force is more and more critical to us in our competitive advantage—that is, the other half that does not go on to college, the people who make products, deliver services, and talk to customers. Their quality and their ability to work effectively is more and more important to all of us.

Beyond that, we like this bill because it begins to focus on a set of issues that are in the workplace itself. Economists have known for a long time that the 60/40 rule, as economists call it, applies almost everywhere, and this is that about 40 percent of your competitive advantage, 40 percent of productivity improvements, for instance, over time come from the things you buy, from buying new machines, from plant and equipment, from buying educated workers even, but that about 60 percent of competitive advantage comes from the way you use what you buy in the actual process of doing the work, and both these bills focus attention and resources on the actual processes of doing work, on the way work is organized, on developing skills that focus on work, especially skills of noncollege workers who work down the line in American institutions. And so we applaud the bills for all those reasons.

A couple of suggestions we would make with respect to the bills are as follows, and they're fairly minor.

In the case of your bill, Mr. Valentine, the focus on building more best-practice in work organization and training in the workplace is commendable, and we support that. We would hope that in addition to that that you might build in some technical assistance functions somewhere in the Government to disseminate innovations that do occur as a result of the demonstration and other kinds of grants that are made.

That is, there are always three ways to get people to do things. One is, you can make them, and the Government does that by regulating and passing laws; the second way you can do it is you can bribe them, and you do that by giving grants and tax incentives and so on; and the third way, and the cheapest way, is you can show them. You can provide technical assistance. And we would hope that in your bill, as well as in the accompanying bill, that the focus on technical assistance might be strengthened—that is, taking the innovations, inventorying innovations that already exist and the ones that come as a result of your legislation, analyzing them, building model practices, and disseminating those practices aggressively to American employers and other institutions involved.

We also applaud, incidentally, the focus here on building information systems for discerning the amounts and the distribution of training in the workplace currently and would be pleased to give you assistance in trying to do that over time. We've had some experience over the past 15 to 20 years in trying to figure out how much training and where new forms of work organizations are occurring. What we have found is that we tend to measure the tip of the iceberg. We don't have the authority and the resources at the Federal Government to do this kind of work.

In general, again, we support these bills with great enthusiasm, both because they come from this committee and because we find that the focus in the bills is, in our view, right on the money and that in fact the shift in focus implicit from an attention to only elite workers in the American system to all workers in organizations is a very healthy thing.

Thank you.

[The prepared statement of Mr. Carnevale follows:]

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STATEMENT OF

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AMERICAN SOCIETY FOR TRAINING AND DEVELOPMENT

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ASTD'S INSTITUTE FOR WORKPLACE LEARNING

SUBMITTED TO THE SUBCOMMITTEE ON

TECHNOLOGY AND COMPETITIVENESS

U.S. HOUSE OF REPRESENTATIVES

SEPTEMBER 17, 1991

CONGRESSMAN TIM VALENTINE

CHAIRMAN

Put Quality To Work

TRAIN AMERICA'S WORKFORCE

Mr. Chairman:

I am Anthony Carnevale, Chief Economist of the American Society for Training and Development (ASTD) and Executive Director of its Institute for Workplace Learning. ASTD is a national membership association representing over 50,000 corporate-based human resource development professionals. The Institute for Workplace Learning is the Society's arm for workplace-based research on issues such as work organization and work processes, skill and training, quality and competitiveness and the use and installation of technology into the workplace.

I would like to begin by strongly endorsing the focus of the two bills before this Committee -- "Technical Education and Training Act of 1991" and "National Competitive Industry Workforce Act of 1991" -- on building learning systems rather than on buying technology. The recent spate of lists of "critical technologies" confirms that America's technological advantage is at risk in a number of critical technologies and some suggest stronger support for research and development and for efforts to commercialize technology. Nevertheless, we also know that one of this nation's greatest competitive disadvantages is the failure to raise the level of manufacuturing processes and service delivery to meet the new competitive standards of the global economy.

I have attached to this testimony, for submission to the Record, the summary of ASTD's latest publication, "America and the New Economy", which describes in detail the new competitive standards of quality, variety, customization, convenience and time. In order to achieve these standards and to compete successfully in the global economy, we must do more than "buy" technology. ASTD's research and the experience of our members in companies makes it clear that organizations and individuals cannot create a "high performance workplace" simply by buying and installing the newest robot or computer integrated manufacturing system or production process from Japan. Organizations must "learn" their way into the advanced manufacturing systems, total quality management or the standards of the Malcolm Baldrige Quality Award.

Economists concerned with productivity have demonstrated that of the factors responsible for increases in productivity, only about 40% derive from investment; that is, from investment in capital equipment/technology and in human capital (largely education). The other 60% (or so) of factors responsible for increases in productivity derives from "advances in knowledge"; that is, the learning and innovation resulting from the work processes, use of technology, organization, research, etc. which occurs within the organization and in the workplace. It is this part of the productivity equation which we must address and I congratulate this committee for holding hearings and for proposing legislation which is concerned with creating and strengthening the ability of business, educational institutions and individuals to achieve these advances in knowledge.

I have been requested to comment on Section 6 of Mr. Valentine's bill to do with "Industry Worker Training Information" and I would also like to comment on Section 4, "American Workforce Quality Partnerships".

The American Society for Training and Development, under a grant from the United States Department of Labor Employment and Training Administration, conducted a three-year (1986-1989) project of research in American companies on the kind, quantity and quality of training, as well as on skill requirements and broader work organization and process issues. There is frequent demand for this data and also for more detailed and more recent information than is available. ASTD has begun a new project to collect additional information from selected companies but this effort will provide only a sample of required data.

There is increasing need for such information, particularly for small and medium-sized businesses, as local, state and the federal government attempt to respond to concerns about workforce skills and the ability of American business to compete internationally. The cost of conducting a comprehensive national survey of worker training programs is prohibitive for private organizations and there are potential problems of access and response rates. Such a survey may be most thoroughly and effectivey carried out under the auspices of the Department of Labor and we support this provision.

The suggested areas for collection of information are useful ones and the addition of international data will be help to establish genuine standards for comparison of the United States with other countries. I would add only that care be taken in the design of the survey in order that distinctions may be made between entry-level training, skills upgrading, training for advancement, etc.

As I mentioned in my introduction, I am glad to see a focus on building learning systems rather then on buying technology and I would like to make a few comments on the "American Workforce Quality Partnerships", Section 4 of Mr. Valentine's bill.

The opportunity to form consortia is critical. 98.5% of manufacturing organizations in this country have fewer than 500 employees. These small and medium-sized enterprises have the least financial and institutional capability to choose and to implement total quality/high performance workplaces; yet they must do so if they are either to compete successfully with foreign products and services or to supply larger companies which use advanced manufacturing systems.

It is also important that the grants for these partnerships require the establishment of ongoing institutional capability for training and other capabilities. The complex nature of new work organizations, work processes, standards and skills associated with the so-called "high performance workplace" or "total quality management" enviroments must be learned over time. The learning process and culture which is established is itself a key element in achieving and maintaining quality and the other competitive standards and this process should be retained.

I would add a provision for technical assistance to this section of the bill. The concepts of "total quality management" and "high performance workplace" have a multitude of definitions and gurus. At the same time, there are many "Best Practices" for manufacturing standards, including those of the companies which have won the Malcolm Baldrige Quality Award. This Committee might authorize the Department of Commerce to begin a more systematic collection of these and other "Best Practices" and to make these models easily available to potential applicants for the consortia grants.

In conclusion, I would note that I have attached a copy of an article, "Technical Training in America: How Much and Who Gets It", published by ASTD's Training and Development Journal (1988). This article, written by myself and Eric Schulz, reports on data from ASTD's research sponsored by the Department of Labor. I submit this for the Record.

Thank you for the opportunity to comment on this excellent legislation.

Technical Training in America: How Much and Who Gets It?

By Anthony P. Carnevale and Eric R. Schulz

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Technical Training in America: How Much and Who Gets It?

By Anthony P. Carnevale and Eric R. Schulz

Technical workers are those who utilize principles from the mathematical or natural sciences in their work. For the most part they work in industries that rely on the application of those principles to create products, services, or processes. Technical workers themselves, besides producing technical products, tend to use technology in their work.

Technical workers are especially important to American competitiveness because they are the lifeblood of industries that produce the lion's share of internationally traded products and services. In addition, they invent and produce the technologies that result in the upskilling of all workers. The continuous integration of new technologies with more highly skilled labor is the true engine of American competitiveness.

Technical employees and technical training are becoming ever more important because they are the key to America's competitive advantage in the world economy. High-skilled, technology-intensive production and services are concentrated in developed nations; low-skilled, technology-poor production and services are concentrated in lesser developed nations. The competitive advantage of the latter lies with their low-wage, low-skilled labor pool, while the competitive advantage of developed nations relies on the application of technology combined with an increasingly skilled and adaptable workforce. Consequently, the only choice for the United States is to shift to a service and information economy in which productivity is embodied in highly skilled people in combination with larger and larger doses of technology. We cannot rely on strong backs and raw resources.

> In the end, competitive advantage is not in the technology but in the people who invent and use it

In the end, competitive advantage is not in the technology but in the people who invent and use it. Technology is footloose and by and large instantly available worldwide. Competitive advantage lies with whoever can most quickly integrate new technology into production or service delivery. Sustaining that competitive advantage means finding new efficiencies, quality improvements, and applications in the production and use of a new technology.

The ability to seize and sustain a competitive edge requires two kinds of technical learning systems: one to teach employees and another to learn from them. A technical education and training system is necessary to upgrade employee skills in order to keep pace with technical change. Employers also need systems for learning from their employees and customers so they may find new efficiencies, quality improvements, and new applications once a technology is in place.

Technical change and skill requirements

Technical change is increasing the technical skill requirements in many jobs, especially technical jobs. New technologies are redefining skill requirements. By decentralizing work, information-based technologies are increasing the autonomy and value of employees at the point of production and service delivery. At all organizational levels people are now responsible for an expanded range of products and for customizing products to meet individual needs. With these broader roles comes greater opportunity to have a positive or negative effect on efficiency, quality, and innovation.

This is the second of three articles based on research conducted under a two-year joint project of the American Society for Training and Development and the United States Department of Labor. More comprehensive coverage of ASTD's research into technical training and the general organization and structure of training in the U.S. will be available in 1989 in four books: Organization and Strategic Role of Training, Technical Training, Accounting and Evaluation, *and* Basic Workplace Skills. *A* Basic Workplace Skills Manual *will be published as well. The authors of this article are part of the staff of the research project.*

Technical learning and the competitive cycle

The competitive cycle is the process by which technical innovations are developed and brought to the marketplace. It can be divided into four phases:

- the discovery or development of a technical innovation,
- the tailoring of the innovation to the institutional culture, strategic niche, and production or service delivery system,
- the actual use, production or delivery of the technical innovation,
- the development of new applications for the original technical innovation.

"Cycle time" is the time it takes to turn technical innovations into cost savings, quality improvements, or new products or services. Speed at getting innovation into the marketplace separates the economic winners from the losers, and learning and skill development are key ingredients in that speed.

Learning is critical to the competitive cycle from the very beginning. In the initial discovery phase of the cycle, employers need structures that allow them to learn from the external research and development community. They also need internal structures that allow them to learn from their own employees' experiences in producing and testing products and services and from their customers' use of existing products and services.

After the initial discovery, the innovation needs to be tailored to a particular employer's culture and competitive niche and integrated into an existing production or service delivery system. In this tailoring and design phase, roles are uncertain, job assignments are broad and overlapping, and employers rely heavily on workers' creativity, problem-solving and team skills. At this uncertain and open-ended stage of the competitive cycle, the more people involved the better. Tailoring and design that relies exclusively on white-collar and technical elites can lead to production or service delivery problems down the line.

After the employer has developed a plan for integrating the technical innovation into the institution, production or service delivery can take place. In this and the next phase of the competitive cycle—developing new applications and innovations—the employer relies on the skills of production and service delivery employees.

The competitive cycle in America

In U.S. manufacturing companies, the cycle time is generally too long. It takes the Japanese 40 months to get a car to market; it takes Americans 60 months. The U.K. is able to get pharmaceuticals to market in 2½ years, one-half the time it takes American pharmaceutical companies.

The strength of the American economic system has always been in the early phases of the competitive cycle. Always good at innovation, the U.S. is less competitive in the production phase. Not surprisingly, the nation's learning system reflects similar strengths and weaknesses. The elementary and secondary schools are good at academic preparation for the college-bound, but less good at educating and training non-college youth.

The occupational education system for non-college youth has less standing than academic preparation in the American education system. As a result, academic learning suffers from not being sufficiently applied, and applied learning does not meet basic academic standards. The post-secondary education system is strongest in the four-year institutions that produce professional, managerial, and technical elites who are critical to initial innovations. The weaker system for preparing those who eventually work at the point of production or service delivery accounts, in part, for our relative inability to generate efficiencies, quality improvements, and new applications there.

Employers' strengths and weaknesses in connecting learning to the competitive cycle are parallel to those of the educational system. In general, the American employer relies on external R&D for new strategies, technologies, products, and services. To the extent employers do have R&D systems, they tend to focus on discovery and design, processes that rely heavily on managerial and technical elites. Relatively few American employers have systems for utilizing production, service delivery, or customer service workers to improve efficiency, improve quality, or develop new applications.

Employer training systems mirror these tendencies. Most employer-based training consists of informal coaching; the formal employer training system is only a third to a sixth the size of the informal training system. Training and development is concentrated among white-collar and technical elites, with production and service delivery workers receiving much less.

Mapping technical training

Attempts to define technical training and the technical workforce are always somewhat arbitrary, and our definition is no exception. As we have asserted above, technical employees are those who use theoretical principles from mathematics or the natural sciences in their work. In general this definition would include technical professionals such as scientists, doctors, and engineers, technicians and technologists in both manufacturing and healthcare, craft workers concentrated in the construction trades, and skilled workers concentrated in manufacturing. By this definition there were 20.3 million technical workers in the United States in 1986. Technical workers represented 18.2 percent of the American workforce. Of the technical workforce, technical professionals made up 24 percent, technicians and blue-collar technical workers made up 18 and 58 percent respectively.

In addition to technical employees, we have also identified two additional and related categories of workers. In the first category are technical support employees—those, such as technical managers and sales and marketing personnel, who work in institutions where products or services are technically based. People in technical support jobs require some technical knowledge, and often they already have a technical background. In the second category are technical education and training personnel, the teachers, professors and trainers who prepare the technical workforce.

In the discussion below we will focus on the technical workforce itself and discuss the extent and sources of education and training for technical workers.

Figure 1 compares the training and development of technical employees with all others. Technical professionals, including scientists, architects, engineers, and health professionals number almost 4.8 million in the American penters, mechanics, and repair workers. The largest number of technical workers is found in the service sector, principally in healthcare. Manufacturing employs about 14 percent of all technical workers, not counting operators and assemblers.

From another point of view technical workers are most concentrated in the construction industry, where one third of all workers are technical workers. The mining, transportation, and utilities industries are next with nearly one fifth of their employees in technical occupations. In manufacturing, services, and government, approximately one worker in six is a technical worker.

As shown in Figure 3, technical workers earn well above the average for all workers. Male technical workers earn more than their female colleagues, but the disparity is less in technical occupations than in the economy as a whole. Female technical workers earn 84 percent of what male technical workers earn, while in the economy as a whole female earnings are only 69 percent of male earnings.

The evolution of the technical workforce

The future of technical jobs is closely linked to the process of technical change itself. Technical skill requirements continually are being ratcheted upward by new technology, and the growth in technical jobs follows a similar pattern. More and more, new technology substitutes for human labor, eliminating tasks or refiguring them into fewer jobs that combine more highly skilled labor with more machine capital. A current example of this is the evolution of operator and assembler jobs into fewer but more highly skilled technician jobs. Over time the evolution of technical work takes on the structure of a pyramid, where labor-intensive and less productive jobs are restructured into a few capital- and knowledge-intensive jobs that are more productive.

Projections on occupational growth to the year 2000 from the Bureau of Labor Statistics (see Figure 4) reflect that pyramidal pattern. Depending on the economic scenario, the number of technical jobs is supposed to increase by 21 to 32 percent in the next 12 years. The same projections for jobs in the economy as a whole are considerably lower, ranging from 13 to 23 percent. As one would expect, the projected job growth increases as jobs evolve upward in the technical occupational hierarchy. As they are among all workers, education and training and development are the keys to that evolution among technical workers.

> Many machine operator and assembly jobs are being reconfigured, consolidated, and upgraded into technical jobs

Even a casual review of those Bureau of Labor Statistics projections demonstrates the necessary escalation of skill and productivity as jobs evolve upward in the technical hierarchy.

Technical professionals

Technical professionals are educated and trained to make broad judgments, to invent, and to apply a particular intellectual discipline to problem solving.

In the healthcare industry, technical professionals include employees responsible for diagnosis and the prescription of treatment to be provided by others. In other industries technical professionals are responsible for developing new products and designs, enhancing existing products, or conducting research, but not necessarily responsible for formal management or direct authority over subordinates. Technical professionals are critical components in the overall design and development phase of the competitive cycle and the diagnostic phase of healthcare delivery.

Principal among these technical elites are the nation's 2.5 million health professionals, 1.5 million engineers, and 800,000 natural, mathematical, biological, and computer scientists. Technical professionals' jobs most frequently require at least a four-year college degree and often formal schooling beyond the undergraduate level. As shown in Figures 1 and 5, technical professionals are the most highly educated and trained of the nation's employees. Compared to other employees, they receive substantial amounts of both education and employer-provided training—formal and informal—both for qualifying for their jobs and upgrading once they are on the job.

All technical professionals rely heavily on schools to prepare them for their jobs. Compared to other technical professionals, engineers and mathematical and computer scientists rely less on schools and more on employers for training to qualify for their jobs. This

Figure 2 — Employment in technical occupations by sex and race

	Women	Black	Hispanic
All Workers	44.4	9.9	6.6
Technical Workers	24.3	6.4	4.8

Source: Harold Goldstein, for ASTD (1986)

Figure 3 — Median weekly earnings (dollars)

	Both Sexes	Men	Women	Ratio
All Workers	358	419	290	.69
Technical Workers	482	501	420	.84

Source: Harold Goldstein, for ASTD (1986) of expertise, they lack the breadth of knowledge in the theoretical aspects of their specialties that is required of technical professionals. Many technicians are graduates of four year colleges, but many have developed their skills and knowledge through technical or vocational schools, community colleges, or on the job training.

Good examples of service sector technicians in the healthcare field are nurses, physical therapists, X-ray technicians, and other operators of diagnostic equipment. Technicians from manufacturing include workers such as circuit board assemblers and quality control technicians who oversee laser equipment in automobile assembly plants.

Technicians usually receive training that applies directly to their jobs. While the training has its basis in theory, it focuses more on specific applications to the job than does training for technical professionals. This mixed focus of theory and application requires technician training to have a mix of delivery methods in order to ensure adequate skill acquisition and transfer. Most technician training includes three phases of instruction:

- introduction of the theories or principles behind the technology;
- demonstration of their application in a job environment;
- hands-on practice of the skills and knowledge application in a simulated work setting.

This mix of methodology is imperative because most technician training is geared to upgrading or updating skills in jobs that require licensing or certification.

The nature of technician training allows colleges (including two-year colleges), universities, and professional associations to be frequent sources of external training programs. Of the $68.9 million provided technicians each year to attend outside seminars and conferences, university-sponsored programs account for $24.1 million.

Most technician training is geared to upgrading or updating skills in jobs that require licensing or certification.

Vendors, especially original equipment manufacturers (OEMs), also supply a considerable amount of technician training and related support materials. Of the more than $3.28 billion spent by employers each year for all outside training and training support services, approximately $103.2 million goes to technician training.

Like training for technical professionals, technician training includes generic courses. Unlike much training for technical professionals, however, most technician training is sequential and job-specific, and includes principles of new technologies (primarily equipment and processing techniques) and new applications for existing technologies. Technicians also take special courses required for licensing or certification, or refresher courses required for license renewal or recertification.

Because of the hands-on nature of the technician's work, courses in safety and hazard communication also are required. In addition, technicians receive specific training in procedures necessary for successful job operation, especially if the procedures are mandated by a government agency. For example, technicians in a drug company receive training in clean-room operation and maintenance, laboratory technicians in a hospital receive training in the maintenance of sterile equipment or the proper recording of test results, and technicians in a nuclear power facility receive training in emergency shutdown and evacuation procedures.

The amount of time technicians spend in training varies widely according to the particular job, the company's support for training, and state and local certification (or licensing) requirements. Few statistics are available concerning the length of training for technicians. One survey (Harwood, 1978), however, examined the amount of training provided to first-line supervisors (which includes some technicians) in 125 manufacturing plants of varying sizes. The study showed that training courses averaged 40 hours of training every six months.

Figure 5 — Qualifying and upgrading training for technical professionals

	Qualifying Training				Upgrading			
Occupation	% with qualifying training	% from school	% formal employer-provided	% informal employer-provided	% with upgrading	% from school	% formal employer-provided	% informal employer-provided
Architects	94%	91%	13%	31%	41%	10%	7%	23%
Engineers	90%	73%	14%	33%	57%	23%	28%	18%
Health	98%	96%	10%	7%	72%	33%	8%	8%
Mathematical & Computer Scientists	90%	68%	26%	41%	65%	21%	36%	24%
Natural Scientists	97%	91%	9%	26%	59%	30%	25%	15%

*Rows can add to more than 100% because some employees received training in more than one category.

our jobs. Data processing occupations continue to be hit hardest by the whirlwind of new information technologies. The fact that these employees receive the brunt of the changes accounts for the high degree of qualifying training and upgrading they receive; the pace of change accounts for the high degree of employer-provided training, because the technology simply is moving too fast to wait for the schools to catch up.

Ironically, computer programs sometimes replace their creators. Jobs that originate with new technology are eventually simplified. For example, general-solution business applications such as VISICALC and LOTUS 1-2-3 are reducing the demand for computer programmers. It is no longer necessary for programmers to understand hardware architecture or to design separate data structures for each application—the two skills, according to the Zemsky and Meyerson in *Training* magazine, that distinguish a programmer analyst from a mere programmer.

Interviews with a cross-section of data processing employees indicate that, with the exception of data entry clerks, data processing personnel generally have college degrees or have attended structured programs at technical schools and received certification. Frequently, courses include managing information systems, computer design and analysis, auditing (of both systems and procedures, including security measures), and programming in specific computer languages, such as BASIC, FORTRAN, and COBOL.

Armed with basic education or certification, the aspiring data processing worker usually enters the workforce as a development specialist or a beginning programmer. User groups (a data processing professional society, for example) are regular tools for problem-solving and training. Information managers who manage other computer professionals as well as computer systems report that although a college degree may be essential for movement into management in this field, support and mentoring from supervisors are often the most important ingredients for success on the job. This accounts for the relatively high level of informal OJT among data processing personnel and also suggests that relatively few data entry clerks get sufficient upgrading for real career advancement.

Blue-collar technical employees

The nation's blue-collar workers number almost 30 million: construction workers, repairers, precision production workers, extractive workers, machine operators, assembly workers, transportation workers, craft workers, and laborers. According to our definition only the precision production, craft, and extractive workers, and some of the machine operators, are technical workers. The remainder of the blue-collar workforce makes up the labor pool from which new technical workers evolve. Technology shrinks the pool by replacing some and leaving fewer, more highly skilled workers who work in combination with the technology.

Skill requirements are increasing on the job, while the overall quantity and quality of entry-level workers is declining

With the exception of extractive workers, roughly two-thirds of blue-collar technical workers get some kind of formal or informal preparation for their jobs. As the reader can see in Figure 1, these proportions are substantially less than the proportion of workers who get qualifying training in the white-collar and technical elite populations. For the training they do receive, blue-collar technical workers tend to rely on informal training on the job more than other occupations do. The same is true for blue-collar upgrading.

Strategic and policy implications

The central conclusion from our data analysis and individual case studies is that America's public and private commitment to technical education and training is on a collision course with emerging economic and demographic realities. Skill requirements are increasing on the job, while the overall quantity and quality of entry-level workers is declining for want of more effective human capital investments before they come to work. This central finding leads us to two related conclusions. After having looked at the overall quantity of technical education and training, we sense that there is simply not enough of it, and that what technical training does exist is unevenly distributed among the technical workforce.

We believe that the insufficient quantity and misdistribution of technical training is a threat to the competitiveness of individual employers and to the nation as a whole. An insufficient quantity of technical training results in a reduced level of technical competence in general. Our underinvestment in blue-collar technical employees results in a competitive profile that makes us pretty good at invention but pretty bad at getting innovations through production and into the marketplace quickly. And it makes us not very good at all at making efficiency and quality improvements in production, and plain awful at developing new applications through innovations learned on the line. In the healthcare area the current emphasis on education and training for medical elites makes us good at diagnostics and prescribed treatment but inefficient at the delivery of quality care.

A third conclusion that arises from our work is that we as a nation probably are not creating new technical workers fast enough. The nation's employers and educators need to be more aggressive about integrating new technology with more highly skilled labor. In manufacturing, for instance, we need fewer operators and assemblers jobs and more technician jobs. Our current posture in dealing with technical change is reactive and passive. We need to be more proactive where technology is concerned—a grudging acceptance of technical change will not suffice.

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AMERICA AND THE NEW ECONOMY

by

ANTHONY PATRICK CARNEVALE

EXECUTIVE SUMMARY

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American Society
for Training and
Development

INTRODUCTION

The emerging economic order depicted in America and the New Economy is founded on a whole new set of competitive standards that are transforming organizations, jobs and skill requirements. Quality is the key of the five new standards and drives the other four -- variety, customization, timeliness and convenience. The extensive field research reported in this study finds American employers and employees working together to build more flexible organizations, work processes, and skills in order to meet these new competitive standards and fully utilize new technologies.

In the past, American employers and workers competed for customers on the basis of productivity - the ability to produce high volumes of goods and services at low prices. In the new economy, competitive advantage is based not only on productivity, but also on the ability of American employers and workers to meet the new standards of quality, variety, customization, convenience and timeliness.

The competitive standards and flexible technologies of the new economy need to be housed in new kinds of organizations. Both large, top-down hierarchies typical of manufacturing and smaller, isolated and fragmented structures typical of services are being replaced by flexible networks. In order to meet new market standards and fully exploit the inherent power of new technologies, authority and resources are being pushed down the line to work teams that make products and serve customers.

The findings reported in America and the New Economy summarize what was learned from almost five years of first-hand exploration in the new world of work. The result is a map that can be used as a guide to action by the nation's business, labor, education and governmental leaders, and as the basis for a common understanding of economic change that will allow more effective collaboration in the interest of the nation's economic competitiveness.

America and the New Economy maps the real economy of organizations and workers, and not the statistical economy so often the focus of debate in Washington. It reports the best competitive practices in real companies and among real workers that are both models of excellence and causes for optimism in assessing the nation's competitive future.

America and The New Economy

The Six Standards For Competitive Success

The distinctive signature of the new economy is a set of new competitive standards that separate winners from losers. Productivity, the primary competitive standard in the old economy, has been transformed and joined by an expanded set of standards critical to success in the new economic environment. In addition to a more robust version of the traditional productivity standard, the new competitive standards include quality; the ability to provide variety and to customize products and services; a focus on convenience for customers; and timely innovation.

"Robust" Productivity: In the old economy market share and competitive advantage were driven by producing high volumes and selling at low prices. The old time religion of productivity emphasized cost cutting as the principle means to the achievement of low prices. In the new economy cost efficiency is still important but productivity gains are increasingly realized with an emphasis on investment and innovation rather than cost cutting. Old fashioned strategies for achieving productivity emphasized "lean and mean" organizations and workforces. Lean and mean organizations and workforces can result in cost savings but are not sufficiently "robust" to provide the quality, flexibility, customer service, and speed which are equally necessary in the new competitive environment. In the new economy, cost cutting has been displaced by productivity strategies that depend on robust organizations and workforces, empowered with autonomy and enabled with investment.

We are still ahead in the productivity race, but our competitors are catching up: while the Canadians only produced $19,679 per person in 1989, compared to the U.S. $20,891, they went from 69.5% of American productivity in 1950 to 94.2% in 1989. Similarly, the Japanese output per person in 1989 was only $15,656, but they went from 16.1% of American productivity in
1959 to 74.9% in 1989.

The American prospect on productivity suggests guarded optimism: factors such as the integration of the baby boom into the experienced workforce, a less gloomy reevaluation of demographic change by the year 2000 and the increased application of new technologies all support the likelihood of improved performance in productivity. Moreover, detailed studies by Denison, and more recently by Baumol, show that although investment accounts for a healthy 40% of productivity increases, almost 60% of productivity increases result from innovations at work or process improvements that occur as organizations and workers make incremental improvements on the job. In other words, the principle lever for productivity improvement is not higher levels of investment but the learning that occurs in work organizations and work teams deep within the economy itself.

Quality: Quality is primary among the new competitive standards. It was no accident that when the nation established its first award for overall economic excellence it was an award for quality, not productivity. American performance on quality is mixed. The quality of our automobiles is on a par with the Europeans but still inferior to the Japanese in most instances. Quality data on textiles, computer chips, and steel is mixed, and quality performance in consumer electronics, chemicals, and machine tools is disappointing. There is still such a thing as American quality. We set the world standard in commercial aircraft, aerospace, large computers, appliances, and health care. There are also individual quality leaders even in industries where our overall performance is mixed. For instance, the GM/Toyota NUMMI plant in auto, Milliken Mills in textiles,Harley in motor cycles.

Variety and Customization: Plain vanilla isn't good enough in the new economy. There is an explosion of products and services in every industry. There are 572 varieties of cars, trucks, and vans compared with 408 only nine years ago. Banking has been transformed into financial services, expanding from a few to more than a hundred services which can be delivered in customized packages for individual consumers. The number of items carried on supermarket shelves has doubled in just ten years as the food industry has learned to tailor products to every taste and diet.

Convenience and Customer Service: Busy people crave convenience. Providing convenience is good business. First there was fast food and now there is food delivered fast. Financial services companies have embedded convenience in new technologies with the ATM machines and electronic banking. Good customer service pays off. It costs five times as much to get a new customer as it does to keep the one you already have. A loyal customer is worth $140,000 over a lifetime to an auto maker and $ 4,400 a year to a supermarket. Every unhappy customer complains to ten others and 82% of customers that go elsewhere do so because they are dissatisfied with the product or service or feel they have been treated badly. Available evidence suggests that Americans are demanding better customer service and feel they aren't getting it. There are notable exceptions. WalMart, the Aid Association for Lutherans, Nordstroms, Federal Express, Motorola, Xerox, IBM and a host of others, lead the way in customer service in American markets.

Timeliness: The early bird gets market share in the new economy. According to one study of hi-tech markets, products that come out on time, but over budget, earn 33% less than products that come to market on budget but six months late.

Institutions compete in several successive races against the clock:

- First Event: Develop an innovation, whether a product, a new technology, or a new work process.

- Second Event: Move the initial innovation off the drawing boards and into the hands of customers.

- Third Event: Race up the learning curve, making continuous improvements and developing new applications.

- Final Event: Use the knowledge accumulated in the race up the learning curve to make a breakthrough to another major innovation.

The American performance on timeliness is mixed. For instance, Japanese auto makers redesign every four years while we still try to make a basic design work for more than ten years. As a rule, it takes us up to sixty-six weeks to get from fiber to apparel while many of our competitors are able to complete the product in twenty-three weeks. The news is not all bad. We are the fastest to the market in aerospace, computers, appliances, and health care and there are individual examples of speedy institutions in every industry: Milliken in textiles, WalMart in retail and Motorola, Xerox and Hewlett Packard in hi-tech.

Seven Forces That Shape New Markets

The report discusses seven forces that are driving changes in competitive standards including:

(1) The Increasing Wealth of Nations: American incomes doubled between the end of World War II and the early seventies, though they have grown more slowly since. Incomes in the rest of the world were relatively low in the late forties but increased astronomically since then.

(2) Economic Globalization: The combined value of imports and exports are roughly a quarter of our GNP. International tastes have been homogenizing rapidly as income and the reach of markets expand. Advances in the technologies of transport, communications, and management have allowed companies to produce and sell flexible volumes tailored to individual markets. Increasingly, companies go overseas to access technical skills, new technologies, and to gain experience with indigenous markets.

(3) The Diversification of Taste: There is no "one size fits all" in the new economy. Consumers worldwide have more money in their pocket and want goods and services tailored to their individual needs. In addition, growing wealth gives a voice to underlying differences in tastes of different age groups, regions, life styles and other differences that were there all along.

(4) The Importance of Time: Americans, especially American women, have more money but less time to spend it. Men have lost more than two hours of their free time per week and are spending an hour and a half per week doing personal chores. Women are working an additional six hours per week and have lost almost three and a half hours of

free time. Busy people have neither time nor patience for shoddy quality, products that are not tailored to their individual needs, poor customer service or slow response times.

(5) Commercialization: More and more of the work and play traditionally provided outside markets is being commercialized. The commercialization of homemaking, recreation, and personal care stems in part from the new work roles for women. Commercialization inevitably expands market standards beyond price competition; for example, price is not the only criterion for choosing care for our loved ones.

(6) Consumer Involvement: A distinctive feature of the product and service markets of the new economy is the extent of consumer participation. For instance, shoppers at supermarkets read labels for quality and content customized to individual diets. User friendly gadgets, from VCRs to ATMs, allow consumers a wide variety of choices tailored to individual needs and delivered conveniently.

(7) Flexible Technologies: The new market standards would not have been possible without an equally new role for technology. Flexible computer based and communications technologies are at the heart of the new competitive standards. The computer has brought a whole new level of quality, flexibility, and speed to production and service delivery. Variety and customization can be delivered conveniently and with precise quality with a few keystrokes. Faxes, satellites, cable, and other communications technologies give the new competitive standards a global reach. User friendly software makes the new technology as invisible to the user as the carburetor is to most drivers.

The New Competitive Framework

The new competitive standards are birds of a feather. They are best understood as a framework in which each standard makes sense only in the context of the others. Each is connected to the others in a flexible and organic whole. Employers who begin pursuing one standard usually end up embracing them all because each overlaps and leads on to the next.

The new competitive framework breaks the iron laws of mass production that ruled the old economy. In the old economy it was generally presumed that there was a tradeoff between productivity and low prices on the one hand and quality, variety, customization, and convenience on the other hand. It was generally believed that producing high volumes of standardized goods reduced costs and raised productivity. Adding quality, variety, customization, and customer service was assumed to increase cost. For instance, one rule of thumb said that cutting variety by half raised productivity by 30% and that doubling volumes cut costs by 25%. The iron law that linked high volumes of standardized goods with low prices has been broken in the new economy. For example, one U.S. manufacturer of automobile components produces ten million parts per year and offers eleven varieties. This company's Japanese competitor produces only three and a half million units per year but offers thirty-eight different varieties. Remarkably, with one third the scale of production and three times the variety, the Japanese company has a labor productivity one and a half times the American company and produces at half the unit cost.

Companies that begin by trying to speed up the time it takes to get products to the customer usually end up saving money as well. Hewlett Packard's just-in-time production system has reduced cost by 20%. Harley Davidson reduced the time it took to make a motorcycle from thirty days to three days and cut production costs by half.

Quality also saves money and is often the best antidote for a case of low productivity. The typical factory invests twenty to twenty five percent of its operating budget finding and fixing mistakes. Xerox's quality program drove costs down by 20%. GM's Lansing assembly plant drove costs down by 21% after instituting a quality program.

Focusing on good customer service also improves productivity performance. The Aid Association for Lutherans replaced specialized functional departments in its insurance services with teams responsible for providing service to individual regions. As a result, personnel costs were cut by 10%, the overall number of cases handled increased by 10% and the time it took to process a case was reduced by 75%.

Continuous Learning: The Cornerstone of Economic Progress

In the new economy technology is treated as malleable and inextricably connected to human and organizational forces at work. It is generally understood that investing in technology without complementary investing in organization and people can be disastrous. The cumulative dynamic of learning tends to confer runaway momentum in the competitive race. Once organizations or whole nations build a lead in a particular technology or product or service line, it is difficult for others to catch up.
Oftentimes the process of economic and technical change is "path dependant" - characterized by incremental changes with one innovation leading to another. In the early stages of technical or economic innovation several alternative paths are open. Eventually, a particular innovation is widely adopted. Once adopted, learning by doing and learning by using leads to an accumulation of incremental improvements. It is difficult to change paths once the process of accumulation reaches a critical mass that allows for a self reinforcing momentum even when superior alternatives emerge. Moreover, it is difficult to access particular paths of technical development once they are fully developed.

Some learning can be copied or reverse engineered but the more experiential kinds of learning, critical to economic and technical progress, are difficult and time consuming. For instance, experience is the best teacher when workers require applied skills like problem solving, that can only be learned in the context of real world situations, or skills like team work that require fundamental attitudinal changes.

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It is critical for organizations, industries and whole nations to choose optimal paths of technical development. Dead ends and suboptimal paths can be costly in human welfare. If a nation decides to make potato chips rather than computer chips it will give away good paying jobs and sacrifice important technical and organizational learning as well as skill development that would lead on to spill over benefits in other industries and even better jobs later on.

How do organizations or even nations choose the optimal path of technical progress? The basic difficulty is that we never know enough about the future to make the right bets and pick the winners. The path dependant nature of learning processes turns economic progress into a game of chance. It leaves us with two strategies: First, we need to mobilize our current knowledge base as best we can to discern best bets on the most likely winners. Second, we need to spread our bets around, encouraging as many alternative paths as possible without diluting our available financial, organizational and human capital. Both strategies argue for maximum access to a free flow of knowledge in organizations, nations, and in the global economy.

The New Economic Life Cycle

Technologies, products and services are constantly evolving, following a path not dissimilar from organic life cycles. Traditionally, economic life cycles have exhibited five separable phases: innovation, installation, competition, maturity, and eventual breakthrough to new life cycle. In the new economy, however, economic life cycles have sped up and lost their sequential structure. For example, today's global institutions sometimes skip the initial development of innovations and instead, borrow innovations developed elsewhere, focusing on the latter, more commercial, phases of the economic cycle.

In the classic economic life cycle there is a tendency to require flexibility only from senior white collar and technical elites and only in the initial innovative phases of the life cycle of particular innovations. In the new economy, however, it is becoming clear that a workforce segmented into broadly skilled and empowered elites and narrowly skilled nonsupervisory employees with limited autonomy can result in costly delays in installing innovations, making continuous improvements and learning new applications.

Organizing and Managing The New Economy

The new economy is preceded by two typical organizational structures: large top-down hierarchies characteristic of big business and big government and small organizations typical in small business, the professions and highly fragmented industries like health care.

Both the large scale behemoths and smaller organizations have been challenged in the new competitive environment. Large scale institutions are flattening hierarchies and pushing autonomy down the line, empowering workers at the point of production, service delivery, and at the interface with the customer. At the same time, smaller organizations are retaining their independence while joining together to realize scale economies. By joining together they can afford more R&D and share the costs of human and machine capital development.

Organizations large and small are moving toward a common organizational format, best described as a network. The networks of the new economy are driven by common goals and outcome standards rather than top-down authority. They preserve balance between the autonomy of individuals and teams at work and the integration of interdependent network partners in pursuit of common goals.
This report examines in detail how a number of industries, including auto, food, chemical and pharmaceutical, computer, housing and apparel, are coping with new organizational demands.

Jobs And The New Economy

Although the new economy will likely create jobs in the aggregate, the processes of economic change will inevitably distribute new jobs unevenly. The new economy will bring good jobs for the vast majority, bad jobs for some, and no jobs at all for others. As a community we are challenged to redress the unequal benefits and burdens characteristic of economic. Ours is a society based on work. A job is the price of admission to the American polity and culture. People unable to get and keep a job eventually disappear from community life, drop out of the political system and fall into the underground economy.

Looking beyond the aggregate numbers to the kinds of jobs the new economy is generating reveals a pattern fitted to the emerging demands of the new competitive standards and networks. The most noticeable trend in the kinds of jobs typical of the new economy is the shift toward service work. There are many reasons for the shift toward service work. Consumer demand shifts toward services as income increases. Higher productivity in manufacturing and extractive industries results in more output from fewer more highly skilled workers in combination with more powerful technologies. New competitive standards require more service workers to design, develop, and market a greater variety of products and to deliver them to customers quickly and conveniently in a global market.

Skill In The New Economy

American employees are developing new skills in response to new competitive standards, technologies, and work organizations. Skill requirements are expanding up and down the line as competitive advantage draws on the skills of both college educated white collar and technical workers and non-college employees who tend to be concentrated at the point of production, service delivery, and at the interface with the customer. Skill requirements in the new economy are concentrated in six areas:

Reading, Writing and Computation;

Learning to Learn;

Communication: Speaking and Listening;

Adaptability: Problem Solving and Creative Thinking;

Developmental Skills: Self-Esteem, Goal Setting, Motivation and Career Development;

Group Effectiveness: Interpersonal Skills, Negotiation and Teamwork

Influencing Skills: Organizational Effectiveness and Leadership Skills.

CONCLUSION

As we enter the last decade of the twentieth century, the nation is breaking a path toward the new economy. But numerous obstacles impede our progress and have become the focus of enormous social, economic, and scientific energy as pressure for growth continues to build.

Inside the workplace, flexible technology needs to be matched with more skilled and autonomous workers and work teams. New, more flexible work organizations that drive authority and resources toward the point of production, service delivery, and the customer are also required if we are to take advantage of the inherent potential of new human and machine combinations.

Barriers that impede progress toward the new economy are apparent outside the workplace as well. Environmental limitations to growth await a technical solution. The new economy is emerging in the midst of a financial dilemma--one that is fraught with savings-and-loan bail-outs, junk bonds, and foreign debt. Also, although the new economy will require massive public and private investments in the nation's human, organizational, and technical infrastructure, at a time when the financial capital necessary for this overhaul is being absorbed in an orgy of public and private consumption. In addition, it is increasingly clear that our ability to stabilize domestic markets is no longer enough; the new economy has gone global, and global economic events tend to affect and impinge on our domestic economy. The unpredictability of global economic events requires new mechanisms for stability. Finally, the demographic surpluses of the 1970s are giving way to longer term demographic scarcity. The number of available workers is declining rapidly. Moreover, more employees will come from populations in which our human capital investments prior to work have been insufficient (Johnston and Packer, 1987).

We can be cautiously optimistic about the American prospect in the new economy. Much will depend on our ability to break through the barriers. Other nations face many of the same obstacles, but we move into the new economic era with the additional burden of our past successes. Old and once successful habits die hard. We set the standards in the old economy. The United States labors on toward the new economy, however, dragging the dead weight of our past industrial successes along behind.

STATEMENT OF JAMES E. SCHWARZ, SR., PRESIDENT, OMNI-CIRCUITS, INCORPORATED, GLENVIEW, ILLINOIS

Mr. Schwarz. I'd like to thank you for inviting me here.

Before I begin, as if you didn't need it, and I don't think you do, I have an entire package here which was translated from Japanese into English by NCMS, of which I am a member, and it is an examination given to a graduate from high school in Japan who is going to go work in a factory, not the one that is college-bound. The results show that their average high school student is equal to our student coming out of a junior college. They're doing two years better education than we are, and I would like to offer this. I think it would make some interesting reading for you to see what they're able to do.

Mr. Valentine. You thought that you needed to have it translated from Japanese into English?

Mr. Schwarz. It was in Japanese. It's the original Japanese test.

Mr. Valentine. We would prefer to have it also in Japanese so that we can have our competent staff do a check on the translator.

[Laughter.]

Mr. Valentine. That's a feeble attempt at humor. We thank you very much for it.

Mr. Schwarz. I will get a copy in Japanese to you.

Mr. Valentine. Never mind. I was just kidding.

[Laughter.]

Mr. Valentine. What is it, about this thick?

Mr. Schwarz. Here we go.

I am president of a medium-size manufacturing company in Illinois. I have a keen interest in the subject of this forum. To demonstrate this, let me give you a little background about me and my company.

Omni-Circuits, Inc., was formed in 1972. At that time, technical expertise for positions in my company was not at all necessary. Common sense, a decent grasp of mathematics, and a willingness to work hard were the only requirements for the job. As time went on and Omni grew, the circuit board we manufacture became more complex. As a result, the machinery and procedures for making these boards grew more complicated.

While boards were becoming more complex—I'm going to throw a couple other advertisements in it, things that happened here on Capitol Hill, if you don't mind—the cost of complying with Federal and State regulations regarding pollution escalated faster than our profits. Making matters all the worse, the prices per square inch of circuit boards were being eroded by foreign competition. Our foreign competitors, in many instances, do virtually nothing to preserve the ecology of our world. They are not required to clean up their water or air. They just simply dump. Our oceans are the recipient of it.

How about a tariff on circuit boards imported from countries that do not control pollution? That would make them clean up their act or cause American companies buying these boards to buy in the U.S. This would help level the playing field a little bit for the U.S. manufacturers.

The United States sends foreign aid all over the world to the tune of billions of dollars and does virtually nothing for American manufacturers whose tax dollars pay for this foreign aid. Do we have our priorities just a little mixed up? I think so.

Along these lines, how about AT&T buying portable phones from Asia after laying off thousands of American workers while, at the same time, Motorola, Incorporated, is spending $120 million a year on education and is manufacturing that same type of phone in the State of Illinois and exporting it overseas?

In order to remain in business, we have been forced to automate in an attempt to reduce the number of people that we employ. This presented another problem. The jobs that remain require a much better-educated employee, which we found in very short supply. We spent $21,000 and received a grant from PIC—the Private Industrial Council—and the State of Illinois in an attempt to upgrade educational levels of our employees. What we found was very disturbing.

Out of 226 employees that we tested, only 79 tested above the seventh grade level, 73 between the fourth and sixth grades. After three months of classes, 11 of the 73 were raised to the seventh grade level, and 16 were raised to the seventh grade level in math. Mind you, some of these people had recently graduated from high school with Bs and Cs. Of the total, 41 people were below the fourth grade level, and we could not afford to attempt to educate them. Making matters worse, more than 50 percent of our group leaders were among the class that we educated.

We don't object to paying high taxes, high wages when value is received. Many of my tax dollars go to education, and my company is not getting its money's worth.

At present, we employ 207 employees, down from the 256 a few months ago. Our investment into this automation was in excess of $850,000, which, in the past, would have entitled us to investment tax credits, but these have been eliminated. With all the advanced manufacturing technique, quality measures, the use of SPC, JIT, and all the other technical innovations, we're barely able to make a three percent profit. The thought often occurs to me that I would make more money on my investment if I put it in U.S. Treasury notes.

I strongly support both bills that you asked me to comment on. I find Mr. Price's bill would be excellent for companies aspiring to hire employees trained at a higher technical level than is currently being required by our company. On the other hand, your bill, Mr. Valentine, more closely fits my need.

Having already stated the problems we are having with hiring, Mr. Valentine's bill should be broadened by starting the training at the ninth grade level. I perceive that high school in the United States today is not teaching and stressing mathematics and science enough. Why do we settle for as little as two years of math being required for graduation? I must have come from the old school. I didn't have a choice. It was four years, period.

The only way that we can be world competitive in the United States is to produce quality superior to all our competitors. Courses such as SPC, design of experiments, and quality-related subjects should be made part of the core curriculum in high school.

We in the United States are very concerned with health, diet, and exercise. Let's begin to develop the mind as well as the body. Then we would no longer have to settle for being a debtor nation. Maybe we could regain the greatness that we had in years gone by.

Two final comments. We as employers need greater tax credits to help offset the cost of training programs, and number two, we need changes in legislation regarding overtime pay when the overtime is generated by education or training. Paying someone overtime for training is a tremendous cost burden.

I thank you very much.

[The prepared statement of Mr. Schwarz follows:]

RESPONSE TO H.R. 2936, "TECHNICAL EDUCATION AND TRAINING ACT OF 1991" AND H.R. ________, "NATIONAL COMPETITIVE INDUSTRY WORKFORCE ACT OF 1991"

I would like to thank Mr. Valentine for inviting me to testify at this hearing today. As president of a medium-sized manufacturing company in Illinois, I have a keen interest in the subject of this forum.

To demonstrate this, let me give you a little background about me and my company. Omni-Circuits, Inc. was started in 1972. At that time, technical expertise for positions in my company was not a necessity. Common sense, a decent grasp of mathematics, and a willingness to work hard were the only requirements for the job.

As time went on, and Omni grew, the circuit board we manufactured became more complex. As a result, the machinery and procedures for making these boards also grew more complicated. While boards were becoming more complex, the cost of complying with federal and state regulations regarding polution escalated faster than our profit, and making matters all the worse, the prices per square inch of circuit board were also being eroded by foreign competition. Our foreign competitors, in many instances, do virtually nothing to preserve the ecology of our world. They are not required to clean up their water or their air. They just simply dump. How about a tariff on circuit boards imported from countries that do not do polution control? That would make them clean up their act or cause American companies buying these boards to buy in the USA. This would help level the playing field a little for all US manufacturing. The United States sends foreign aid all over the world to the tune of billions of dollars, and does virtually nothing for American manufacturers whose tax dollars pay for this foreign aid. Do we have our priorities a little mixed up? I think so. Along these lines, how about AT&T buying portable phones from Asia after laying off thousands of American workers while, at the same time, Motorola, Inc. is spending $120 million a year on education and is manufacturing that type of phone in the State of Illinois and exporting overseas.

In order to remain in business, we have been forced to automate in an attempt to reduce the number of people that we employ. This presented another problem—the jobs that remain required a much better educated employee, which we found in very short supply. We spent $21,000, plus a grant of $19,000 from Private Industry Counsel and the State of Illinois, in an attempt to upgrade the educational level of our employees. What we found was very disturbing. Out of 226 employees, only 79 tested above the 7th grade level, 73 tested between the 4th and 6th grades. After three months of classes, 11 of the 73 were raised to the 7th grade level in reading, and 16 were raised to the 7th grade level in math.

Mind you, some of these people had recently graduated from high school with B's and C's. Of the total, 41 people were below a 4th grade level, and we could not afford to educate these. Making matters even worse, more than 50% of our group leaders were among the class that we educated. We don't object to paying high wages and high taxes, when value is received. Many of my tax dollars go to education, and my company is not getting its money's worth.

At present, we employ 207 employees, down from 256 a few months ago. Our investment into this automation costs in excess of $850,000, which in past years would have entitled us to investment tax credits, but these have been eliminated. With all the advanced manufacturing techniques, quality measures, the use of SPC, JIT, and all the other latest technical innovations, we are barely able to make a 3% profit. The thought often occurs to me that I would make more money on my investment if I put it into US Treasury Notes.

I strongly support both bills you asked me to comment on. I find Mr. Price's bill would be excellent for companies aspiring to hire employees trained at a higher technical level than is currently required by my company. On the other hand, Mr. Valentine's bill more closely fits my needs. Having already stated the problem we are having with hiring, Mr. Valentine's bill should be broadened by starting training at the 9th grade level. I perceive that high schools in the United States today as not teaching and stressing mathematics and science enough. Why do we settle for as little as two years of math being required for graduation? I must have come from the old school--I didn't have a choice. It was four years, period. The only way we can be "world competitve" in the United States is to produce quality superior to all our competitors. Courses such as SPC, design of experiments, and quality related subjects should be made part of the core curriculum in high school. We in the United States are very concerned with health, diet and exercise. Let's begin to develop the mind, as well as the body. Then we would no longer have to settle for being a debtor nation. Maybe we could regain the greatness that we had in years gone by.

I have two final comments: 1) We as employers need greater tax credits to help offset the cost of training programs and 2) we need changes in the legislation regarding overtime pay when the overtime is generated by education or training; paying someone overtime for training is a tremendous cost burden.

Sincerely,

James E Schwarz

James E. Schwarz, Sr.
President/Omni-Circuits, Inc.

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STATEMENT OF DAVID R. PIERCE, PRESIDENT, AMERICAN ASSOCIATION OF COMMUNITY AND JUNIOR COLLEGES, WASHINGTON, D.C.

Mr. PIERCE. Thank you, Mr. Chairman.

My name is David Pierce, and I appear before you as President of the American Association of Community and Junior Colleges speaking on behalf of that association, the Association of Community College Trustees, the Joint Commission on Federal Relations, supported by both of those organizations, and the American Association of State Colleges and Universities.

I had the privilege of sitting in early as the presenters previous to this panel appeared and became excited and enthusiastic as I heard all the fine comments made by community colleges, or made about community colleges. This is my third month on the job, and I was not aware that we had such outstanding support from Members of Congress, and I want to at least state how pleased I was to hear the comments that were made about our Nation's two-year colleges.

Also as I listened, it dawned on me that the focus of at least one of these bills is essentially focusing on my own experiences. I am a community college graduate and attended that college after failing miserably in high school and miserably right after high school and then joining the service, recycling myself through Korea back to California, and then enrolling in one of the colleges in that State, and enrolling as a mathematics major and ultimately completing my two years there, and then transferring on to one of the universities in California, and then ultimately receiving my Doctorate from Purdue University. And as I thought about the goals of these pieces of legislation, it was easy to relate what was trying to be accomplished here to my own experiences.

We support these two pieces of legislation and commend you, Mr. Chairman, and also Mr. Price, for the effort and leadership that you have made in presenting these bills for consideration. In the case of H.R. 2936, we see two major areas here that would help community colleges, or at least two-year colleges. One would be to strengthen the advanced technology manpower development, and that would be done through developing programs, through developing our instructional core, through developing increased partnerships and sharing with industry, and through the development of five centers that would share their expertise, their resources, and their models with other institutions. These would be very helpful to our Nation's two-year colleges.

We do have difficulty in the advanced technology areas and in obtaining a steady flow of qualified instructors. We're in constant competition with industry in this area, and in many cases, the only resolution and solution is to develop partnerships with industry and use the expertise and resources that are tied up in industry. We feel that this bill, if passed, would be helpful in that area.

The five centers that would be created to develop resources and develop models in the area of advanced technology appear to me to be modeled somewhat after what happened and what is going on in South Carolina right now where several centers in specialty technology areas have been developed, and there is little question in my mind that these would provide a valuable boost in resource to community colleges as they attempt to develop advanced technology programs. There is no easy and convenient resource now available.

The idea of strengthening science and mathematics through the development of five centers is also appealing to us. This is something that we are all very concerned about. The whole issue of transfer to senior institutions is one that we're constantly working on and constantly vigilant about, and we're particularly interested and concerned about the transfer of our minority students, and this bill, of course, would address that issue and give it a great assist. We in community colleges enroll a large proportion of the Nation's minorities enrolled in undergraduate education—a large proportion— and in fact, in many cases, the majority of minorities enrolled in higher education are enrolled in community colleges.

The issue of transfer of minorities is a very real issue, and we feel that we share your concern in this regard. If you study the pipeline, which is talked about frequently, the proportion of minorities that achieve Associate degrees and then Bachelor's degrees and Master's degrees and ultimately Doctorates is a steady declining progression, going down to approximately two percent of our Doctorates being awarded at least to our blacks. I don't know the percentage for all minorities. And if you view that relative to the proportion of blacks in the population, for example, you can see the problem. In science and mathematics, approximately four percent of our science and mathematics employees are minorities, and this is substantially below the proportion of the population.

So this is a dual problem that we're interested in, and we feel this bill would help in that area. We feel we want to be a part of the solution, not a part of the problem.

The second bill that is being considered today we also commend and feel that it compliments the first and, in some cases, is very similar to the first.

We focus on the concept of the Youth Technology Apprenticeship Program. We find this concept is supportable, and we commend you for your emphasis on requiring proficiency in science, social science, English, and mathematics. And we also commend you on the attention you've paid to trying to provide opportunities for these students to transfer to four-year institutions. This is certainly a nontraditional kind of lower-division backgrounding for transfer, but it is the kind that should be addressed and should be put on the table. After all, we're trying to affect the lives of human beings, and there's no reason why such a nontraditional route shouldn't be recognized and be preparation for transfer.

We also concur in the findings that are listed in the second bill. We are vigilant, agree, and concerned about the development of our work force, and we, of course, are constantly attempting to improve and strengthen our efforts in this area.

We do have one note of concern, and that concern is one of fragmentation. In the second bill, we have parts of it assigned to be administered by the Department of Labor, some of it by the Department of Commerce, and then the Statewide tech ed and training network by the Department of Education, and we just simply want to make the point that by multiple assignments to various departments, it does continue to create the complexity and create the problem of developing a consistent, coordinated manpower development for our Nation. We understand the difficulty and the problem in that regard, but we do want to at least make mention of the concern that we have in this area.

One final remark in the area of comments made by Dr. Williams. I was privileged to attend the National Science Foundation meeting that he referred to in May. It is my observation that the National Science Foundation is in fact becoming increasingly sensitized to the two-year college sector and is attempting to address their needs and to bring them into their programs, albeit under a lot of encouragement, help, and assistance from the two-year colleges in that direction.

In responding to that Foundation's concern about these bills possibly being in competition with their existing programs, I've always been given a very simple explanation of that when I have addressed those concerns in the past, and that is you simply appropriate the money out of new funds. It's just that simple. New funds. Then there's no competition.

Thank you very much for the opportunity to appear before you.

[The prepared statement of Mr. Pierce follows:]

Testimony

on

Technical Education and Training Act of 1991 (H.R. 2936)

and

National Competitive Industry Workforce Act of 1991

by

David R. Pierce
President
American Association of Community and Junior Colleges

Subcommittee on Technology and Competitiveness
Committee on Science, Space and Technology
U.S. House of Representatives
September 17, 1991

Mr. Chairman, the community, technical, and junior colleges are most grateful that you have called these hearings on the Price bill, H.R. 2936, and your own bill, the National Competitive Industry Workforce Act of 1991. These bills speak strongly to the most important aspect of the towering challenge our nation faces in its efforts to rebuild its competitive edge -- the aspect of human resource development.

General Schwarzkopf has been quoted as saying that the Allied Forces' success in the Gulf was "97 percent people, 3 percent technology."

I am David Pierce, President of the American Association of Community and Junior Colleges. My testimony speaks not only for the AACJC but also for the Joint Commission on Federal Relations of AACJC and the Association of Community College Trustees.

We appreciate, Mr. Chairman, the time and effort that have gone into these bills. We are aware of the work that you and the Subcommittee did in the last Congress -- before Congressman Price moved from the Science Committee to the Appropriations Committee -- on draft legislation along the lines of H.R. 2936.

The broad bipartisan cosponsorship the Price bill has attracted is a good indication of the importance and timeliness of the initiatives it proposes. H.R. 2936 ranks at the top of our priorities for public policy. Going as far back as the 98th Congress, the AACJC and ACCT have urged Congress to act on the initiatives this bill contains. In this regard, we would be remiss not to acknowledge the persistent efforts that your former colleague and Subcommittee chair, Doug Walgren, made to advance these concepts.

Rarely have the public and private sectors of our country been as much in agreement about one thing as they are today about the need for a world-class workforce. Without such a workforce -- and without a strategy to achieve it -- the American economy faces a continuing decline of its competitive position in the global marketplace. And, without it, government on every level is bound to continue to find its revenue insufficient to cope with demographic change, urban and infrastructure decay, educational reform, and mounting budget deficits. No one has put it more succinctly than the National Governors Association in its 1990 report, "Excellence at Work," which said, "Increasing the competitiveness of the American workplace is a matter of national economic survival."

You are fortunate to have Ira Magaziner here to speak for the provocative study that he cochaired with William Brock and Ray Marshall. The dilemma of "high skills or low wages" is easily as urgent as he portrays it.

A national strategy for human resource development is just as essential to our national security as it is to our competitiveness. As the Price bill states in its findings: "the United States increasing dependence on foreign producers for advanced technology products threatens not only our economic independence, but our national security as well." We see the Price and Valentine bills as the building blocks of such a strategy.

In our view, each of the three program initiatives in H.R. 2936 builds a partnership to meet a high priority national need.

The poor articulation between plagues two-year and four-year college programs in most states is inexcusable in today's competitive environment. Often, this problem is most acute in the fields that bear most heavily upon national competitiveness -- math, science, engineering, technology, and teacher preparation.

The articulation grants in the Price bill would encourage university faculty in the sciences to work closely with their peers in nearby community colleges, to smooth the transfer tracks for lower-division students who want careers in science, teaching, or engineering. These modest grants could pay huge national dividends in expanding the flow of qualified scientists, engineers, and technicians that American employers must have to match the workplace advances of our global rivals. The articulation problem and the weakness of undergraduate education in the sciences should be of the highest concern to the National Science Foundation.

Equally important in the Price bill is the support for regional centers of excellence at community colleges, five to focus on basic science programs and five on occupations of advanced technology. Our family of two-year colleges abounds in highly qualified candidates for both networks. The rapid advances in manufacturing technology are making solid foundations in math, basic science, and critical thinking just as important to technician training (as the Japanese and Germans have proved) as to transfer studies in science and engineering.

These centers would become the clearinghouses that high-tech employers and the community colleges need to ensure that technician and paraprofessional training is on the state-of-the-art level. A partnership of this kind between community colleges and the NSF, focused intensively on the improvement of undergraduate programs, is long overdue.

The third partnership program in H.R. 2936 would strengthen and expand the vital bridge between undergraduate education and high-tech employers. The matching grants that it would provide to joint industry-college programs that fill immediate technician shortages could yield dividends to undergraduate education almost too numerous to count. It has always puzzled us that the NSF resisted this concept on the ground that NSF does not belong in the training business. This basically is a grant program, just as much as the NSF programs that advance doctoral studies.

The ablest scientists and engineers on the doctoral level are going into industry today just as often as into university research. Under these partnership grants, such talents would be working with community colleges in much greater numbers, both in the design and instruction of technician training and lower-division science programs associated with such training. At the same time, they would increase the colleges' access to state-of-the-art equipment and technology, while also exposing undergraduates to outstanding career models outside academia itself.

Together, these initiatives would strengthen NSF's contribution to competitiveness significantly. At the same time, they form a three-fold assault on higher education's failure to bring more women and ethnic minorities, and more Americans in general, into science and engineering careers. The fact that more than half the doctoral candidates of the nation's engineering schools are foreign students is stark testimony to this failure. It has become known as the "pipeline" problem which President Bush's FY'91 budget graphically described this way:

> "The 'pipeline' of young people that feeds the S&E [science and engineering] workforce may not be adequate in either numbers or quality to provide the workers that will be needed during the next decade and beyond. Between 1980 and 2000, the number of 18-24 year olds will decline by 19 percent while the overall population will increase by 18 percent. Even if the historic average holds, and five percent of the 18-24 year olds obtain S&E degrees, the resulting shortfall in the S&E workforce could reach onto the hundreds of thousands. Moreover, many students with an expressed interest in science and engineering careers leave the pipeline before getting a degree in science and engineering. This is particularly true for underrepresented minorities. Currently Black and Hispanic children constitute 25 percent of our school children; by the year 2000 this percentage will rise to 47 percent. Yet it is these groups that are now the most underrepresented in the S&E workforce: in 1988, only 231 Black and Hispanic Americans earned doctorates in science or engineering fields (excluding psychology or the social sciences). Together, Black and Hispanic Americans constitute 20 percent of the nation's population, but only four percent of employed scientists and engineers."

The two-year colleges are serving more than half the Americans who start college and, for the reasons that the Price bill addresses, they are badly under-utilized in meeting the "pipeline" problem. From President Bush's election, and from his determination to double NSF funding during his administration, AACJC and ACCT have urged Congress to give undergraduate programs a 25 percent floor in the NSF budget, so that the improvement of undergraduate science and technology would receive half the growth of the NSF budget. AACJC and ACCT are allied with the American Association of State Colleges and Universities (AASCU) in seeking this goal. If university and community college faculty work together to improve and broaden the transfer tracks in science and engineering, as the bill intends, career doors in these fields will be opened to much greater numbers of less advantaged Americans, and American competitiveness, as well as society, will benefit enormously.

It is surely conceivable that the Price bill programs over time will make teaching careers in science attractive to more minority students, at the same time enriching the preparation of secondary teachers in these fields. Of the six goals that the National Education Goals Panel is pursuing, under the leadership of the NGA and the White House, the hope of reaching Goal No. 4 -- "By the year 2000, U.S. students will be first in the world in science and mathematics achievement" -- is nil as long as a majority of the secondary science and mathematics teachers are, as studies show, teachers who were not math and science majors in their undergraduate preparation. Colleges of education should be prodding their university colleagues in science and math to work with community colleges to eliminate the transfer bottlenecks.

Mr. Chairman, the community, technical, and junior colleges will do all we can to help you achieve final passage and funding of H.R. 2936 in this Congress. Congressmen who are not yet cosponsors of the bill are hearing from colleges in their districts. A similar effort is being made in the Senate in support of S. 1146, Senator Mikulski's bill that parallels H.R. 2936 in several major respects.

In global terms, the things we have said about the importance of the Price bill should also be said about the National Competitive Industry Workforce Act. The bills complement each other in many ways. Both point federal policy toward the human resource strategy the country must have both to compete in a global marketplace and to maintain its leadership in science and technology.

The Section 4 program, American Workforce Quality Partnerships, parallels the industry-college partnership concept in the Price bill, yet opens the door to a greater diversity of public and private-sector partners.

It makes the Commerce Department the source of the matching federal grants, rather than NSF. This dichotomy points up one of the fundamental issues of competitiveness policy: Can the United States achieve a cohesive, effective strategy for human resource development as long as the initiatives to raise the workforce skills remain spread among so many agencies?

We think the answer to that question is "no." Until the Congress or the President designates one Cabinet rank officer to orchestrate the policy and strategy on human resource development, national goals and federal programs will continue to be frustrated by fragmentation. Perhaps the Commerce Department should be the locus of such leadership since, in the words of the NGA, we are engaged in a global contest of "economic survival." But as long as Congress has vocational education and student aid lodged in the Education

Department, JTPA in Labor, technology transfer in Commerce and Defense, welfare client training in Health and Human Services, and undergraduate science in NSF waste and duplication of effort will continue to undermine the effective use of precious federal resources.

If my tone shows some frustration, it is echoing our colleges. Community colleges in many instances are called upon as delivery systems for all or nearly all of these programs on the local level. The fragmentation takes a heavy toll in administrative expense and time, when campus budgets already are stretched drum tight. Some of our colleges have shown great ingenuity at piecing the federal programs into what they call the "client centered" approach, but again at a high price in staff resources. This is a very effective approach with welfare clients and economically disadvantaged students. In a typical case, the college may blend some Perkins money with welfare assistance and a Pell Grant, to get the student through courses that provide marketable skills. It is a case by case effort, tailored to the client's specific needs. Congress would do well to hear first hand the experiences of some of these program managers.

Turning again to your bill, Mr. Chairman, it illustrates the fragmentation also in the Youth Technical Apprenticeship Program (Section 3), which it would place with the Labor Department. Section 3 could well be an effective complement to the Tech-Prep program and the Cooperative Education program, both of which are lodged in different divisions of the Education Department. The Assistant Secretary for Vocational and Adult Education is implementing the Tech-Prep program, while the popular Cooperative Education program is administered by the Assistant Secretary for Postsecondary Education. Yet these programs, as with your apprenticeship proposal, all have a single national aim -- which is to help business and education work in closer harmony to the benefit of skill-minded learners.

We greatly appreciate, Mr. Chairman, the strong and integrated role that your Apprenticeship program gives education. We commend your emphasis on "proficiency in mathematics, science, social science, and English," as well as on opportunity "to advance to four-year institutions of higher education, in lieu of career entry, upon successful completion of the apprenticeship-like experience." This is beautifully consistent with what we think of as the American Dream. We do not think that our country has to "Europeanize" its schools and colleges in order to meet the competitive challenge, but we do have to have a cohesive national strategy for human resource development.

We applaud the bill's reference to the States doing a better job of harmonizing state training initiatives with federal incentives, and to the "systematic" collection of training data. This latter effort should document the state and trends of training in both the public and private sectors. It is a task that might appropriately fall to whatever Cabinet officer should be assigned responsibility for coordination of the human resource policies and programs, rather than to the Small Business Administration.

Such responsibility could fall to the National Science Foundation, if it were elevated to Cabinet rank. We could readily endorse such a step.

Clearly, Mr. Chairman, your bill is intended to form a federal policy framework that would be responsive to the "America's Choice" report. It deserves the best thinking and the most constructive input that community colleges and the rest of higher education can offer.

In summary, Mr. Chairman, we see H.R. 2936 as an important beginning, a vital step in making the NSF more broadly responsive to the human resource and competitiveness challenges. Its employer-college partnership program could become the demonstration model that proves up the promise of the larger partnership concept in your bill. And, thanks to your leadership and the earlier groundwork that the Committee has done on this concept, it is a program that could be enacted and implemented before the 102nd Congress is over. Thank you again for this opportunity to speak for the nation's two-year colleges.

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Mr. VALENTINE. Dr. Pierce, you're in the right place. You'd do well here.

[Laughter.]

Mr. VALENTINE. Just put it in. It's okay.

Now, I do have some questions of all of you, and let me say at the beginning that, again, we appreciate the fact that you would come and share this information with us, and it has been and will be helpful to the Subcommittee.

Dr. Pierce, tell us a little bit more about what you mean by this national human resources policy that was referred to, I think, in your written testimony.

Mr. PIERCE. Well, this is an issue that has long been raised by the AACJC and ACCT, and that is, you know, the need for the Federal Government to have a more understandable, more comprehensive, more coordinated approach to the development of the Nation's manpower. We end up with a fragmented approach too often because we have so many different departments and different entities of the Federal Government involved in administering pieces and parts of it, and our position is and has been for some time that there is a need for some integrative approach to all of this to have a more understandable, a clearer, and a simpler approach to the development of our Nation's manpower. By having it so fragmented, I think there's little debate that we do have some inefficiencies and slippages along the way.

Mr. VALENTINE. Mr. Schwarz, can you tell us a little bit about the training program at Motorola and what percentage of your employees that company trains, what sort of training do they receive? And then I want to get you to tell me if you — what do you think about the Baldrige Award? But let me just stop asking and listen.

Mr. SCHWARZ. Okay. Regarding the training that is offered, it's more than offered. It was made mandatory if you are to remain a select supplier.

To give you a little background, at one time there were 120 board manufacturers that were selling to Motorola. Now there's five. Obviously, we all have a much nicer slice of the pie, but there are some requirements, one of which is to apply for the Baldrige, but let's get back to that later.

Basically, the requirements were taking statistical process control, design for experiment, and cycle time reduction. If you take any one of those three, the improvement in quality is tremendous, and the savings is well beyond anything that you could believe.

If you'll notice in my remarks, I thought that we should start some of those things in high school so that students graduating would at least be literate in the terminologies and have an idea about what it's all about, and I don't think it would hurt somebody bound for college at all.

How many people have I had attend college—the university? Probably about 25 of my employees.

Mr. VALENTINE. How many employees do you have?

Mr. SCHWARZ. I have now 206, but we had 256 or 257.

Mr. VALENTINE. Now, the training that you're talking about that was required of Motorola, was that training accomplished in a college or at a Motorola facility?

Mr. SCHWARZ. Okay. Motorola itself established the Galvin Center some years ago—it was named after the founder, Paul Galvin—and it is now Motorola University in conjunction with several of the local universities. You can literally get a degree from Motorola University. They developed all of these programs over a great deal of trial and error.

There's a very nice article about it in the Harvard Review, which was written by Dr. William Horn, who is the director of that university.

And the courses were designed specifically for their factory, and then Bob Galvin, in his infinite wisdom—and he's got an awful lot of it—thought that since they buy most of the things that put value-added to their product from the outside supplier, we better get better outside suppliers, and therein came the reduction of the supply base to something that they could better control and something that they could better afford to educate.

So they opened the university to their suppliers to bring us in to be educated by them so we can build a better product to send to them.

Mr. VALENTINE. Now, did the instruction that we're talking about, was that given to all of your employees or just a select number?

Mr. SCHWARZ. No, not all of them. It was given to the —

Mr. VALENTINE. And how did you select those that received the training?

Mr. SCHWARZ. Okay. All upper management took them and all middle managers took them, the idea being that much of what was there was brought back, and I'm talking down to a group leader that might have 10 people under them. They did attend the college to get, for instance, courses such as SPC and design of experiments, which are extremely important to us, because we have thousands of places we can screw up a product, and yet we're supposed to make 3.4 bad per million. We will, the good Lord willing, but it's going to take still a great amount of effort.

Those people then transferred knowledge gained at Motorola's school and transferred it to the people that work for them, so that we are now doing statistical process control virtually down on the line by the people. They're doing statistical control, they are doing the statistical process maintenance so that we don't have a down machine. We do maintenance on it before it breaks. We anticipate what its life cycle is and correct it. Much of that is being done by the employees on the floor, as Ms. Quesada said before. It has to go that way.

That's unfortunately the way the Japanese did it. I read recently something like it takes 120 different people to maintain a factory in the United States, and in Japan it takes four, and they're doing all the maintenance that those 120 did. So they're cross-trained to a great degree.

Mr. VALENTINE. Now, you're talking about people who receive training and they do things with their hands, they have explanations from experts, they have all of the instructional aids that are necessary, and they are tested. It's not like a seminar. They don't go in and people talk to them and then you hope they assimilate, absorb some of the information. You test them to see that they have learned.

Mr. SCHWARZ. They actually have on-hands experience. In SPC, for instance, they will actually run the bell curves on a simulated program. It's very much so real live time, and when they do get out, when they finish, they do have a very good knowledge of the subject that they sought to learn about.

Mr. VALENTINE. Is there a relationship between the hourly wage, the pay, and attendance at this college?

Mr. SCHWARZ. Well, yes, back door, okay? If they don't go to the college and they don't learn, they're not going to get a pay raise.

Mr. VALENTINE. Okay.

Mr. SCHWARZ. We do merit pay raises at our company. We are nonunion, and it is strictly on merit. What did you do in the last 12 months? And by that, it determines what your new pay rate will be. We are using a MIMA scale—Midwest Manufacturers Association scale—which categorizes all aspects of jobs, puts it into a wage category, a class number which corresponds to wage, and then by merit, they are within that range, whether they're bottom or top. We don't keep too many that are on the bottom. We attempt to encourage them to get up to the middle and top.

I don't want to forget about Baldrige, by the way.

Mr. VALENTINE. Yes. I don't want you to.

[Laughter.]

Mr. SCHWARZ. When it first was handed down as a dictate by the Chairman of the Board at that time, Bob Galvin, and he said all of our suppliers will apply for the Malcolm Baldrige Award, and at first I contemplated that, and I thought, "Boy, he's got a lot of nerve asking"—

Mr. VALENTINE. That was about as bad as Government interference, wasn't it?

[Laughter.]

Mr. SCHWARZ. Yes, that was pretty bad. Well, I don't want to get into Government interference.

[Laughter.]

Mr. VALENTINE. Oh, my God, I take that back.

Mr. SCHWARZ. You may never let me come back to Washington again, and I do want to visit the place again.

I thought it was really something, and then I equated it to running a marathon. In a marathon, only one person wins, but everybody that completes the marathon, they're winners. They get much out of it. The process of applying for Malcolm Baldrige Award will in itself make a company much better in quality.

I heard a lot here about quick cycle time. We're turning product at Motorola, different types of radios, in an 18-month cycle instead of four and five years, and they're trying to bring that down even farther yet.

Unless you have absolute quality and control all the way — and that's why I don't see enough quality education. I'm not referring to—I'm talking about education about quality in manufacturing. I don't think there's enough of that being taught, and we are a—literally in the Chicago-end area, we have two grades of high schools students, and that's why this bill is so very, very interesting. You've got those that are going to college and those that will become drug dealers, and there's nobody being trained to work in industry, and I think your bill is excellent along those lines, too.

Let's train these young minds so that they can do something, but let's make quality a big issue, because we're sure getting beat up in manufacturing, and I don't think we all want to attend Hamburger U., which is located in Elk Grove Village, and therefore, you're then qualified to run a McDonalds. There's just not enough jobs like that. We need manufacturing, and I don't think we should give up on it. I think we can certainly do it, and education is absolutely the way to bring manufacturing back.

You've got great examples in these plants that outproduce American plants. Shame on us. And they're run with somebody else's ideas. And the whole thing started with an American that went to Japan because nobody would listen to him in the United States. Shame on us again.

Mr. VALENTINE. Well, I agree, and you talk about quality, and I'm not sure there's anything else but quality. And, you know, somebody said that if we didn't have Japan, we'd have to invent it.

Mr. SCHWARZ. His name was Ken Stork. He's the reason I'm here.

Mr. VALENTINE. Yes?

Mr. SCHWARZ. He's my booking agent. He's the corporate director of purchasing at Motorola. It was either him or it was one of his colleagues, but it came out of the Motorola chain. And, yes, it is the best thing that ever happened to us, I think, if we now win.

Mr. VALENTINE. One shudders to think what some products manufactured in the United States and operated on public highways would look like today and drive like and last like if it wasn't for some competition. Well, that's another thing.

Mr. SCHWARZ. That's terribly true.

Mr. VALENTINE. I'll get mail because of that if anybody's listening.

[Laughter.]

Mr. VALENTINE. Well, Dr. Carnevale, let me ask you if you would give us a little more information about the situation, as you see it, of American companies and their willingness or unwillingness to invest in worker training, and what do you see as—summarize your views as to the responsibility of American business and industry.

You know, the government has a responsibility, the Federal Government especially, but American business also has some responsibility, which, in many respects—I don't mean to suggest that's not understood. Mr. Schwarz just gave us a good description of the extent to which his company understands it, but I would like for you to address that situation. Give us a few more words about it.

Mr. CARNEVALE. Well, the fundamental issue in a business organization, really in any organization, is trying to promote learning, and there are a couple of ways you can do that. One is—and the one that's getting a lot of attention these days—is it has to do with the way you organize the work. Most of us learn the way we do our jobs by doing our jobs and having other people look over our shoulders and teach us how to do our jobs. These days, there are team-based systems and other kinds of structures, most of which we've learned from our competitors, that teach us how to organize work better so that people learn how to do their jobs better and improve products over time better.

The other way you can learn on the job is somebody can teach you formally. They can build a course, they can sit you down and train you, which is most of what is understood by the Government—that is, formal education and training. In that regard, in the United States at least, most of that occurs among large companies. We do about $30 billion a year in training in the United States. It is a system that's relatively easy to describe. It's a system that has three or four learning tracks or curriculums in it. One is what I would call a managerial curriculum. People get trained in that curriculum because they have some responsibility on the job for other people. Executive development is a piece of that management training, and then for noncollege workers, there's supervisory training.

The second reason people get trained on the job is because they bump into technology somewhere along the way, and in the workplace, that's the training of engineers, scientists, technicians, craft workers, technologists in health care, apprentices. I'd also toss in data processing training there, which tends to be a separate system in most institutions, and I'd toss in safety training, because most safety training, regulated or not, has to do with technology of one kind or another.

The third reason people get trained in the workplace is they have some relationship with the customer. That's sales and marketing training, cashier training in retail, and so on, and then there's another set of reasons people get trained these days that are sort of strategic. One of them is quality training, team work training and, in relatively few instances, basic skills training. Of that $30 billion I was talking about, about eight-tenths of one percent of that is basic skills training, a couple hundred million dollars.

An important point here is that—two or three points. One is, where training occurs in American institutions and employer institutions, it doesn't occur because the schools failed. It occurs because the training is necessary, and the training system in the workplace, formal and informal, is necessary, even if the schools perform perfectly. The second point is that most of the training that does go on goes on in large institutions. The third point is that the training that does go on in large institutions is roughly evenly divided between college-educated workers and noncollege workers. Most of the technical training goes to noncollege workers simply because there's more of them.

But the last point, and maybe the most important one, is that even though we do $30 billion worth of training in the workplace a year, only about 15 percent of American workers get any training from their employer. So where it goes on, it's not bad, where it goes on, it's pretty evenly distributed between elite workers and noncollege workers, but it just doesn't go on in many places, and that's the bottom line.

What you do about that's another question. I mean, you know, that gets into a set of political issues. You can do what the commission which I sat on that Ira Magaziner chaired recommends, which is do what the French and the Australians do, which is make every employer train up to one percent of their payroll. If they don't, they kick back in the residual to the Government, and it spends it on training. A penalty system. You can do what they do in Ireland and some other nations in the world, and you can bribe people, you can give employers a tax credit to train. You can do what is more affordable and done almost everywhere else except the United States—you can provide lots of technical assistance in training to promote training in the workplace, which is a relatively cheap way to go.

So in the end, the training system we have is one that, where it exists, is pretty high-quality, and Motorola is a case in point, but it just doesn't exist in many places is the bottom line.

Mr. VALENTINE. Dr. Carnevale, would you—could we get you to comment on section four of the bill which I intend to introduce? I'd like to have your expert opinion as to whether you regard that as conceptually sound and your opinion as to a program which we have, called the American Quality Partnerships Program.

Mr. CARNEVALE. As I recall, section four is the piece— at least sticks out in my mind—is the notion of giving grants and promoting experimentation with new forms of work organization and, by implication, I think, the training and some other things in the workplace. It is generally agreed these days—Ira's commission and four or five others that preceded it all came to the same conclusion that we need to change the way work is organized in the United States in almost all our institutions, and that is a profound change, mostly because it requires that we turn our institutions upside down and rely more on the people down the line in organizations, which means you're talking about changing power relationships between people.

Promoting that sort of thing and the discussion of it in your bill and the accompanying materials and the approach to it, I think, is fundamentally sound. What you'll end up doing is promoting these kinds of changes out there in the real economy in lots of places.

The one addition I would make in that section, if I read it correctly, because I don't think I saw it there, was the real trick, I think, after we promote these sorts of things— and the Baldrige Award, for instance, is another kind of tool we're using to promote these sorts of things—is that we've got to find some way to build an inventory of what people are doing, build models out of what they're doing, and give it to other people so they can do it, too.

The gentleman—Mr. Schwarz pointed out that the Baldrige Award is like a race, a marathon, I think he said, and that's exactly right. Everybody who participates learns something. Most people don't participate. A very small proportion of American institutions participate in Baldrige, and Baldrige is sort of like—I'm old enough to remember— a TV show called "Queen For a Day." If you get to win the Baldrige Award, everybody knows you're good. If you win the Baldrige Award, you get lots of attention.

But the difficulty is that if you don't win the Baldrige Award and if you don't participate in the process, you know everybody who did is better and the one who won is real good, but you don't know how to be like Motorola or like Cadillac or like Federal Express, and there's nowhere to go to get technical assistance to teach you what it is they do that's so good.

And I think that is one of the—at least given the current budgetary situation and the current political situation, it seems to me that the small things that we can do, things that are included in these bills that aren't terribly expensive in terms of giving people financial incentives to do things better, but another cheap thing we can do is we can begin to disseminate best practices in terms of what they do. We can build infrastructure in places like Departments of Commerce and DOD and DOE and all over the place that begins to disseminate these practices and make them available to other people.

I personally think we ought to build some kind of a Baldrige Institute that attaches to the award and make that available to anybody who wants it. If you want to know what kind of a compensation system is state-of-the-art these days in manufacturing, there ought to be someplace you can call and have somebody at least send you a brochure. Better than that, you ought to be able to get some direct technical assistance from somebody, especially if you're a small employer and you can't afford these things.

So the only thing I would add in section four, if I've understood it correctly, is I think you're promoting all kinds of innovation out there in the economy, and I think the trick is to capture that and make sure everybody knows so other people can use it once it occurs.

Mr. VALENTINE. Thank you, sir.

Ms. Quesada, I have purposely saved you until the last. I wanted you to hear these additional comments and to stress some of the things that the witnesses said initially in their principal testimony, and I wanted to have an opportunity to kind of highlight or conclude this session by some further statements from you.

You are here because this subcommittee heard testimony back some months ago about an automobile manufacturing plant in California that was fully unionized—owned by, according to our information, an American company—that manufactured an American automobile. And a situation developed there where there was excessive absenteeism, low morale, high defect rate, and the country was on—the company was on the slippery slope to financial oblivion, we were told. And a new management team, a change of ownership brought people in in management positions from Japan, and the same union with the same members was there after the transition. Everything else was virtually the same, we were told, except what these new managers brought with them.

And I would like for you to tell us, first of all, what you believe the role of training had in this change and some things that happened in your life personally that affected your opinion of yourself when you went home. I think you alluded to that. And just with that, I'll just stop and ask you to answer that part of the question, and then we'll try to expand on that.

Ms. QUESADA. Okay. I'll try to answer all your questions to the best of my ability. I'm actually honored to be on a panel with such distinguished gentlemen, and I was impressed with all their statements.

I would like to make one thing clear. NUMMI is an American company, and we do embrace philosophies and concepts from foreign countries based on what we felt—what I think NUMMI feels is the best that they have to offer. We've also taken the best that American companies have to offer and have formed basically a concept that's particular to NUMMI in itself because of the situation that we encountered when we were first formed.

I was one of the workers, like I had mentioned before, that worked at the plant when it was considered all those negative things. We were unionized; we still are. We had an absenteeism problem—

Mr. Valentine. Excuse me. You say when it was "considered" all these things. Was it all these things?

Ms. Quesada. I think a lot of it was true, and a lot of it was—my opinion, from the inside out, I always felt that people tended to blame the workers for the problems that existed. Any time you talk about absenteeism and lack of quality, there's always a tendency to look at the person who's performing the job and say that that person is at fault. But looking at it from the inside out, I felt that a lot of the problem was management and the way that they were looking at the worker, and the system that was in place really allowed no other response from the worker but to not care.

And I think that that training was so crucial when NUMMI was first formed, because basically the very top level of our company had to be trained, and the very, very highest level of management was sent to Japan to study a new way of looking at things and a new way of looking at a work force.

Mr. Valentine. Were these the same old managers who were just retrained overseas or different people?

Ms. Quesada. I would say 50 percent just on my personal knowledge. I can't give you exact figures, but quite a few of them were. Fifty percent of our current management, I would say, is from the old plant, yes.

Mr. Valentine. And, of course, the foreign country we're talking about is Japan.

Ms. Quesada. Yes, it is Japan.

Mr. Valentine. And did they bring in—did the company bring in management personnel from Japan, Japanese nationals?

Ms. Quesada. Yes, we do have consultants that come in from Japan and help us on various stages, but the majority of our management is American, and all the work force—the majority of the work force is American.

Mr. Valentine. Well, can you tell us some of the things that happened to you personally, other than you had an opportunity to learn more jobs and—

Ms. Quesada. Okay. To myself personally, first of all, when the plant closed, it was pretty traumatic. I think not just to me, but to the area in which I live in, the Bay Area. The San Francisco Bay Area as a whole was pretty devastated on the closing of a plant the size of our plant, which—

Mr. Valentine. How many people did it employ?

Ms. Quesada.—employed 6,500 people at the time of the closure.

Mr. Valentine. At one location?

Ms. Quesada. At one location, yes. One plant. And at the peak, it employed 6,500, and as time went on in the economy—I don't know if you remember in the early 1980s there were a lot of auto plants closing, and there were even in our community other plants that closed, other auto manufacturers that closed. At the time, we eliminated little by little. Management first closed off a truck department and then dropped second shifts, so it wasn't all at once, but in a matter of a year and a half, we went from 6,500 to zero, with the doors absolutely closed forever, basically, until NUMMI opened up.

The majority of the workers—

Mr. **Valentine**. Excuse me. How long was the plant closed?

Ms. **Quesada**. The plant was closed—the last day I worked was in March of 1982, and the plant didn't open up until the middle of 1984, and that was just management-level. The majority of the workers, regular rank-and-file workers, were not called back until early 1985. So you're talking three years out on the street.

Mr. **Valentine**. But when the new company was organized, what percentage of the people who went back to work were employed in the failed company?

Ms. **Quesada**. I would say 75 percent of us are ex-plant workers.

Mr. **Valentine**. And it was a union shop before and a union shop after?

Ms. **Quesada**. It is a union shop now, yes.

Mr. **Valentine**. Was there a change—what changes were made in the union contract?

Ms. **Quesada**. That's an interesting process, also. The union—even when the plant closed, the union—because the union owned its local building and because the union is part of a regional and international organization, the union was still in force. The plant closure affected the union in that the local union went into receivership because there were no longer any members, but when the new company was formed, they had the foresight to know that in our area they would have to deal with the union to make this company work.

And so from the very beginning, our local union was a part of the negotiation process, which meant negotiating all the different classifications and all the different issues that arise when you're forming a plant like that. One of the things that they negotiated was how much of our current work force would be ex-plant workers.

Mr. **Valentine**. Was there a profit-sharing arrangement?

Ms. **Quesada**. I really don't know. I don't think so. I'm not sure. I don't think so. I don't remember that being one of the issues. Again, this is just on my personal memory.

Mr. **Valentine**. Were the working—were the hours of work, was that a problem that you recall that entered into the deterioration that we talked about? Was that one of the problems? Or was the vacation benefits, health benefits, were those things problems?

Ms. **Quesada**. When we signed our first contract, our first union contract, in 1985, it was comparable to the rest of the auto industry. There were some things that we didn't have that the rest of the auto industry had—maybe a little less vacation and issues like that.

Mr. **Valentine**. But how did it compare to what you had with the defunct company?

Ms. **Quesada**. To be honest with you, the big difference was not so much in our contracts and our benefits; the big difference was just in the outlook and in the feeling and the attitude in the plant. That's where—it was a difference between night and day. Workers, I think, when they started at my plant, at NUMMI, had to come in with an open mind and with an attitude that things were going to be different, and there were a lot of issues about the old plant that have been brought up that made our new management question the ability of the workers to do the kind of work technically and quality- wise that they were asking of us.

So that was—I think the big question was, could the work force from a plant that was defunct and had old habits and old traditions and old standards, could the work force from that plant be a part of a new concept of looking at things and be viable and energetic about new ideas? And I think that that was the big question when we first started.

Mr. **Valentine**. Were there any problems with respect to the physical plant, the age of the plant, the restfulness of the atmosphere in the old as opposed to the new or the new opposed to the old? Was there a safety problem? Was the machinery different? Was it easier to operate the machinery in the new plant than in the old?

Ms. **Quesada**. What I noticed, one of the big differences was the upkeep in the building. Our building was fairly new. It had only been built in 1962 when we closed down, so for a manufacturing plant, I'm sure you're aware, that's very new.

Mr. **Valentine**. And you went into that same plant without any—

Ms. **Quesada**. Into the same plant.

Mr. **Valentine**. Without any addition—

Ms. **Quesada**. There was some retooling in a couple of departments. There were some robotics brought in that we didn't have before. But the bulk of the plant and the majority of the system, like the paint system, which is a real elaborate—the paint department in an auto manufacturing plant is key, because the first thing a customer looks at when they buy a car is usually the paint and the quality on the exterior. The paint department is the same department as we had before at the old plant.

Mr. **Valentine**. What about the state of automation and the use of computers and a system that of itself would help to eliminate mistakes?

Ms. **Quesada**. We have made big improvemerts on that. Not so much when we first started, but we've been working there for over six years now, so in the process of the six years, we've done a lot of retooling and a lot of improvements, with constant training on the part of the work force to be able to accept the new tools and to move along with the new equipment brought in. So there has been some retooling done. And our new truck plant, which is something that we just, as of this last August, we produced our first truck, is all brand new but still within the shell of our old plant, but we never produced those size trucks before, so all that equipment is brand new.

Mr. **Valentine**. Tell us about, then, how you were treated in the new operation by your supervisors, by your foremen, and other managerial people.

Ms. **Quesada**. I do want to touch on that. I really think that's important. It's extremely important, because I think a lot of manufacturers need to understand that depending on how you treat a worker and depending on the attitude just to begin with coming in the door, I think that determines how much you're going to get out of the worker.

Actually, the work force that came in from the old plant I would say had real hesitations about whether this new concept could work, because we were told from the beginning that it was based on mutual trust and respect and all the things that, from our experience, weren't true. We wondered—we actually looked around and wondered how many of the old managers could learn a new way of thinking and a new attitude toward workers. I think that from the very beginning for myself—because I was real skeptical. I really was. When I first started work at NUMMI, I thought, "Okay, well, we're saying all these wonderful things. Let's see how long it lasts."

And I think that the system, the way it's built in to have input and dialogue back and forth between just a regular worker on the line and management—we had the very highest manager walking among the assembly line worker, we have assistant managers that will talk and know people by name. That system was real different than it was before. Before, you saw just your supervisor, and everybody else didn't exist. There wasn't any of the dialogue between—I feel real comfortable that I can go to the president of our company with any issue, and I have, and it seems idealistic, but it does work.

And it's not to say that it's perfect, but those kinds of open avenues of communication are real important in how a regular worker is felt or is made to feel by a company. I think that when workers are encouraged to have input and are encouraged to think of new ways to come up with ideas and to make changes on a machine, that then you have a worker paying attention to his environment and being excited about where he works and caring about the product and caring about the company.

Mr. **Valentine**. How did they deal with that problem? Was there a suggestion box, or would you just take a—you'd go talk to your foreman about—you'd say, you know, "Why don't we try to do this differently?"

Ms. **Quesada**. We have a formal suggestion program, and I do mention that in my written testimony. We have a suggestion program which awards employees credits, and these are coupons that are redeemable at local stores here or whatever, and you — we have had regular people on the line get up to thousands of dollars worth of credits, depending on how much their idea saves the company.

And we have a committee that's made up of a regular worker, a union official, and it's just a plant-wide committee that determines how much each suggestion is worth, and the suggestion goes through different levels. I can submit a suggestion to my group leader, and if he sees that I'm just saying, "Instead of changing this oil barrel every day, why don't we make it a 10-gallon barrel and change it once a week? It will save us so much in labor," he can say, "Okay, I'll give you 15 points," which translates to $15, and he has the authority to do that. And as we go further up monetarily, it goes up in terms of assistant manager, managers, and finally, the committee.

So it's a real vibrant program, and you'd be surprised how many people participate and how many people have made a lot of money on it. And nothing is out of its reach. It could be a safety suggestion, a suggestion that affects labor, it could be something as simple as ways to clean up a spill, it could be anything. It could be as complicated as—one gentleman had won, I think, $3,000 on a suggestion. We had our engines coming over already filled from Japan with transmission oil, and he suggested, "Why don't we, instead of paying all this freight from Japan, fill the transmissions here?," and it saved them in shipping, it saved in a lot of different things, and he made a tremendous amount of money on that and was very proud of himself because he thought of it.

So those are just examples of how regular people can participate and be effective in saving the company a lot of money.

Mr. VALENTINE. Was there anything like that in the old regime?

Ms. QUESADA. No, not that I remember.

Mr. VALENTINE. All right. What about in the—there was a—well, let me ask you this. How many—this company, was this the only operation, the only plant, NUMMI?

Ms. QUESADA. NUMMI?

Mr. VALENTINE. Yes. I mean, was this the whole operation? You say that it was an American company.

Ms. QUESADA. NUMMI is the current company that I work for.

Mr. VALENTINE. Right. Okay. And do they own another automobile manufacturing factory someplace else?

Ms. QUESADA. NUMMI is an American company, and it's got two parent companies, Toyota Motors Corporation and General Motors Corporation, and they are considered our parent companies jointly.

Mr. VALENTINE. Okay. Well, is there another NUMMI factory in Memphis, Tennessee, or Tacoma, Washington, that you know of?

Ms. QUESADA. Actually, General Motors—that I know of? General Motors learned from the NUMMI experience and is trying it in the new Saturn plant, from what I understand.

Mr. VALENTINE. Okay.

Ms. QUESADA. So, yes, the concept is being adopted in other plants.

Mr. VALENTINE. Now, in the factory there, in the building there, there's a cafeteria.

Ms. QUESADA. Yes, there is.

Mr. VALENTINE. Is there a place for officers only, no enlisted personnel?

Ms. QUESADA. At our old plant, we did have a very nice, fancy cafeteria—

Mr. VALENTINE. I'll bet you did.

Ms. QUESADA.—with actually porcelain plates.

Mr. VALENTINE. I'll bet you did.

Ms. QUESADA. And then we also had—

Mr. VALENTINE. Do you have that now?

Ms. QUESADA. No, we don't.

Mr. VALENTINE. Was there in the old plant a separate parking for—

Ms. QUESADA. Yes, there was.

Mr. VALENTINE. That was closest to the front door, was it?

Ms. QUESADA. Yes, it was.

Mr. VALENTINE. And you could not park in that area?

Ms. QUESADA. Anybody can park there now, yes.

Mr. VALENTINE. Do you have anything like that now?

Ms. QUESADA. No. And this is reality, and I'm smiling only—

Mr. VALENTINE. It's a small thing, isn't it? Isn't it a small thing to do?

Ms. QUESADA. It is a very small thing, and I'm smiling because it brings back so many memories.

Mr. VALENTINE. But yet they come to Congress and say, "What should we do?"

[Laughter.]

Mr. VALENTINE. Maybe we should say, "You just treat people right," huh?

Ms. QUESADA. Well, I don't know. Do Congressmen have their own parking spots?

Mr. VALENTINE. Pardon?

[Laughter.]

Ms. QUESADA. I'm just curious. Do Congressmen have their own parking spots, or do you park with the general public?

Mr. VALENTINE. No, no. Everybody here has their own parking spot, and everybody here has a name on it.

[Laughter.]

Ms. QUESADA. Okay. So you function basically the way our defunct plant functioned.

[Laughter.]

Mr. VALENTINE. Yes, we do.

Ms. QUESADA. Not to be disrespectful. I'm just—

Mr. VALENTINE. No, no, that's a good question. You are dealing here with the Nation's last Plantation Society.

[Laughter.]

Ms. QUESADA. I'm sorry. I didn't mean—

Mr. VALENTINE. No, no. No, my dear. No. You—

Ms. QUESADA. But, yes, we did have separate cafeterias, and not only that, but I remember at one point—I have always been—

Mr. VALENTINE. They didn't have separate elevators, did they?

Ms. QUESADA. No, no. This is—I'm not exaggerating. I have always worked in the plant, and I consider myself just a regular worker. I've always worn coveralls and steel-tipped shoes and the regular working uniform. At my old plant, there was one time when I had to go into the front office for something, and something struck and I had to use the restroom and actually got in trouble for using the administration restroom for women, and I was told to get out. So it is very real to me the differences in our companies.

Mr. VALENTINE. Was there—and I'm not going to ask you many more questions because you've just about cured me, as we say.

[Laughter.]

Mr. VALENTINE. Was there a routine that involved participation in athletics, and was there a gym in the new arrangement, and finally, were there things like an effort to encourage, under the new regime, to encourage the workers to become involved in civic activities and Christmas projects and that kind of thing?

Ms. QUESADA. Oh, yes.

Mr. **Valentine**. And was that different from the way things were before?

Ms. **Quesada**. Boy, you have no idea how different. First of all, you've got to remember the old plant was very, very traditional in that it was a huge corporation. This corporation is humongous, and it was managed as such. I had no idea who our higher level people were, and I had no idea who anyone beyond my supervisor was, and in all the years that I worked there, I don't ever remember a Christmas function or any kind of function that allowed us to become humans as opposed to someone on an assembly line.

At NUMMI, it's really interesting how we have bowling leagues, baseball leagues, I am a member of a coed softball team, we have tennis tournaments, we have chess tournaments. I mean, they actually encourage—we've had ping-pong tournaments. We also have every year a Christmas party. We have every year a picnic, a company picnic, and we have 3,600 people, so it's not a small company picnic. Our company rents one of the amusement parks in our area, Great America, or they let everybody vote and decide where it's going to be, and everyone can come with their family at a real reduced rate.

There are a lot of things like that that people may think aren't important, but really when it comes to feeling like a part of a company, it makes a lot of difference. It really does. And sometimes I even am surprised at how many of my coworkers get excited about some of the events.

We have a basketball floor that was put in by workers. We have ping-pong tables, and every day at lunch, you'd be surprised how many guys are out there playing ping-pong and playing basketball. We also have people who run at lunch time. There's just a whole lot more of a healthy feeling about the environment than there was.

Also, the company paints and cleans constantly, and it makes such a big difference to have clean walls and just a general clean attitude about where you work.

Mr. **Valentine**. Thank you, ma'am.

I will recognize the gentleman from Massachusetts, Mr. Olver, who I don't think has a designated parking place certainly. If you do, all of your folks do.

Mr. **Olver**. Thank you, Mr. Chairman. I shall cherish the experience of sitting here and listening through this last set of questions. I just wanted to ask a couple of things of Ms. Quesada.

The union—is there only one union in the plant, and that is United Auto Workers?

Ms. **Quesada**. United Auto Workers.

Mr. **Olver**. And you mentioned that something like 75 percent of the employees in the present plant are from the failed, although the size now is 3,600 versus something like 6,500 before?

Ms. **Quesada**. Yes.

Mr. **Olver**. So there are still a lot of other people that are someplace else?

Ms. **Quesada**. Yes. When the plant closed, the old company offered openings across the country to employees that wished to take those positions. A lot of our ex-workers went to Springfield, Massachusetts, and St. Louis, Missouri.

Mr. **Olver**. What percentage of what would be called management, if in the—well, what would be called management come from the failed company?

Ms. **Quesada**. I would say maybe 50 percent.

Mr. **Olver**. Really? That many?

Ms. **Quesada**. Based on how many I know by name, yes.

Mr. **Olver**. So this is truly a case where some old dogs learned some new tricks in both management and labor's side of the equation?

Ms. **Quesada**. Yes. You do have to keep an eye on them, though, constantly.

[Laughter.]

Ms. **Quesada**. No, honestly.

Mr. **Olver**. They do backslide?

Ms. **Quesada**. Well, I think that any company—they do. We do. I think all of us do.

Mr. **Olver**. Both sides do.

Ms. **Quesada**. Everybody does, because there's always a tendency to want to get into your old habit. I think a lot of what makes NUMMI competitive is the fact that we continually remind ourselves that there are new ways to look at things and that we do have to keep training, and there is a constant improvement process. So, yes, we do learn new tricks constantly.

Mr. **Olver**. I was wondering if I would find that in fact the percentages would be quite different on the part of the two, but it is interesting to know that quite a large percentage of both the management—three years later, really — and of the work force came from the failed company. That's good.

Ms. **Quesada**. On the middle management level, when we first started, a lot of the assistant managers that were hired were not from the old plant, but as time has gone on and new openings have come up, NUMMI has a real good policy of hiring from within and promoting from within, so there are people that I remember working on the line with me who are now assistant managers or group leaders, as we would call them.

Mr. **Olver**. I see.

I wanted to go back to a comment that was made by Mr. Schwarz that really struck me.

You say—at one point, you had commented that in high schools, there are two groups of people: one is going to college, and the other is going to drug dealing. That's a paraphrase, but somewhere close to what you said, I think, and if I've made a wrong inference, please—

Mr. **Schwarz**. That's what I said.

Mr. **Olver**.—please tell me. I suspect that there is an issue both on education and in business that we would find that a very high correlation of the people in the second of those categories would benefit greatly from Head Start and that they are probably identifiable as high-risk dropout problems rather early on, and I suspect on the one hand we need a much stronger role and commitment on the part of business in understanding that, and maybe at the dropout level beginning to take an interest in people early on and maybe grade school—certainly at high school, but probably even at grade school—and assuring people that they have a real and serious job available if they will continue high school.

But at the other end of the scale, probably some substantial need for an involvement on the part of education, broadly education and as an establishment, and its understanding that there is 50 percent of the population that really isn't going to go on to college and on to a four-year program, and that they have also a very considerably greater obligation toward that 50 percent that isn't.

Mr. SCHWARZ. Could I—I'll answer your question in a second.

Mr. OLVER. Please. I'm not sure there was a question, but please comment.

Mr. SCHWARZ. I'm dying—I have to ask her another thing.

You now are talking about a 40 percent reduction in workers, roughly.

Ms. QUESADA. Roughly.

Mr. SCHWARZ. How are you in units produced, the old company versus the new company?

Ms. QUESADA. I'm not sure. I know we produce over 200,000 vehicles a year, and I don't have—

Mr. SCHWARZ. Do you know what the old company did?

Ms. QUESADA. No, I don't.

Mr. SCHWARZ. You have no feeling—

Ms. QUESADA. I don't remember, to be honest with you.

Mr. SCHWARZ. I was just curious whether the new system became a heck of a lot more productive.

Ms. QUESADA. Oh, we are more productive.

Mr. SCHWARZ. I would be willing to bet you're making more units than they did in the old company.

Ms. QUESADA. Yes. I know we are. I don't know the specifics, but, yes, we are.

Mr. SCHWARZ. Okay.

Now to get back to the other thing.

Ms. QUESADA. I'm sorry. I also have a question for you.

[Laughter.]

Ms. QUESADA. If you don't mind, you mentioned—

Mr. SCHWARZ. Mr. Valentine, I hope we're not getting you mad up there.

Mr. VALENTINE. No, no, no. I think this is great. I just said we got them talking to each other.

[Laughter.]

Mr. VALENTINE. Go to it. We can stand a little informality this late in the day.

Ms. QUESADA. Thank you.

You mentioned in your presentation at the very end about training being done on overtime and the costliness of that training. I wondered if—do you look at training as a problem or as something that someone punishes you with, or do you look at it as something that you, in the long run, end up gaining by?

Mr. SCHWARZ. Okay. I view it as a totally positive thing. It has nothing but good-good, win-win about it. All I was saying is I think I could get some relief from having to pay you as a worker, for an example, time-and-a-half to go to school. If you worked your 40 hours and if I give you 10 hours of free education, I'm perfectly willing to pay you straight time for that 10 hours. What I was saying is I didn't want to pay time-and-a-half for that 10 hours.

Ms. **Quesada**. I can understand that.

Mr. **Schwarz**. Because I was giving you something, I want you to give me something. Okay?

Ms. **Quesada**. NUMMI's training program is all done on straight time. Yes, and I can understand that.

Mr. **Schwarz**. The laws where I come from don't let me do that, so I paid time-and-a-half when I did the education.

Ms. **Quesada**. You should come to California, and you wouldn't have to do that. Where are you based?

Mr. **Schwarz**. Chicago.

Ms. **Quesada**. Oh, okay.

Mr. **Valentine**. Well, if you're going to move, now, I've got a little something I want to suggest to you.

Mr. **Schwarz**. Yes, I kind of figured you could find me another State to go to, and I don't think it was quite that far south, was it?

Mr. **Valentine**. Just right for you.

[Laughter.]

Mr. **Schwarz**. Just right for me. Okay.

I'm going to kind of gunshot this a little bit. Germany has a great program where the students make up their mind what they're going to kind of early, and they get into a career path that is going to take them to be a worker in a factory, and they do the co-op education where they go to school so many hours and they work so many hours at a factory, and there they're guaranteed a job, et cetera, and that's been one of the reasons why Germany has been very, very successful in manufacturing.

Right now my brain just shut down, and the other thought has left me, but it's going to return very quickly, I hope. Keep the cameras rolling.

[Laughter.]

Mr. **Olver**. I guess the only point I was making is that I think that there is an interdependence of business and education in dealing with what you've clearly identified as a problem in high school.

Mr. **Schwarz**. It came back to me. If you watched "20/20" within the last couple of weeks, they had a great story about a school in Chicago called the Corporate School that was funded by private funds. I know it was Sears, and it was Globe Glass, and I think it was Baxter. They dumped in about $3 million. The principal is not the principal, but the chief operating officer, and it's run like a business. Every teacher is paid according to how much they produce in education.

And to answer part of you, a student started there— number one, they went in the poorest area of the city, and the only requirement to attend there was that you had to live in the area, and it was a lottery draw, so they didn't pick the creme de la crop or anything else. They took whatever won the draw. They also started the children at two years of age, and the school runs from two to 12, and they feed them breakfast, and they teach them how to brush their teeth, and they feed them lunch, and some of the kids, that's all the food they're getting.

They have gotten extraordinary results out of the school. The principal knows that she's on a basis where she could be fired at any time for nonperformance. The job security is not there, but the ability to innovate—and the pay was about 110 percent of public education.

And I think things like that, making the schools—I've got educators on each side and I'm liable to get beat up here, but I think that in a lot of cases, in huge school districts with enormous numbers of students, we tend to—they're on strike for a pay raise at the beginning of the year. I don't even know how good they're going to do that year, and now I'm already giving them a pay raise for what I hope to heck they're going to do, and I think that's wrong. I'm in favor of merit pay. It works great in industry, and I know it works in my factory tremendously, and I think it would work—you've got to do something to change education as we're doing it in the earlier grades, because, as you mentioned, we're losing a lot of them very early. Very early.

Mr. OLVER. What's the business involvement in this school that you described?

Mr. SCHWARZ. Oh, they shelled out about $3 million, bought the building, and pay for it. It's free to the students, it's free to Chicago. The corporations are doing it because they felt that the worker that they're getting to hire — here's what we're here for.

Mr. OLVER. Are they assuring the jobs at the output level?

Mr. SCHWARZ. No, they're just simply doing the education. I shouldn't say that. I don't know if they are or not. To begin with, they're only educating until age 12, so it's certainly not out of high school, but they have gotten tremendous results out of it, and their reasoning was that what they are getting to hire is not technically trained well enough, so they're going to try something to get better employees sent to them. And that was the idea behind it. They somehow or other found $3 million to do this little venture, and it's been extremely successful. I thought it was a good innovation.

Personally, we spent quite a bit of money on education, and I don't think I got much of a buy-back on it, and the biggest problem was I think the reading skills were so bad that—and it equates to, by the way, that if you can't read, you don't do math well. That fell right in line.

And I just loved the idea of the co-op education. I think it's terrific. We've had some. We've had maybe a dozen students, but I don't think it was a very dedicated program. It was kind of "The student isn't doing well, so we'll give him a grade for going to work in the afternoon and he'll make a few bucks, and then we can graduate him." And I don't think that—the training at school was not tailored to the needs of the job. They weren't really preparing him for a job; they were preparing him to get him out of high school.

Mr. OLVER. Let me ask Dr. Carnevale a question.

You, at one point, suggested that there ought to be technical assistance added to the legislation, and I'm curious. I went back and started reading your testimony of all things, and there are, in your first page, a number of rather cogent comments, I think, about that organizations must learn their way into advanced manufacturing systems and your description of where 40 percent of investment is and where the other 60 percent is. But then I'm wondering, who are you going to have do technical assistance? Who is to give technical assistance? Are we to make public grants, Federal grants, for technical assistance to be provided by whom? Educational institutions or whoever? Who?

Mr. CARNEVALE. It seems to me that when we—I would reach for the thing that's closest at hand—that is, in terms of this committee. It seems to me that we've begun to build a piece of infrastructure in the United States around technology and using technology for competitive purposes, things like the three manufacturing institutes that have been created in the last few years. There is a system of Federal labs and centers that are technology-related.

There is a large piece of technology infrastructure, including the National Science Foundation and a whole variety of other institutions. Their traditional mission has been to look at technology, I would say, from an elite perspective—that is, in the development of technology in a fairly academic sense, the perspective of scientists and, to the extent it's been practical, from the perspective of engineers. And what needs to be added to that perspective and to the missions of all those institutions—and there's a full array of them in our technology community—is a mission that says you're not only responsible for the development of technologies themselves, but because we know that developing technologies is at best 40 percent of the game, you also need to provide technical assistance to real work organizations in the installation and in continuous improvements and the use of those technologies. I'd start there.

The other path of least-resistance strategy, I think, is I'd go to the Department of Labor, which has an Office of Work-Based Learning. It is not a formal part of the Department of Labor. It is simply an office that has been created internally. I would give it some official status and some budget and ask them to work with the Bureau of Labor- Management Administration, which is also part of the Department of Labor and tends to focus mostly on union and managerial cooperation in the workplace and is very expert on a lot of these issues, and give them some resources to provide more technical assistance to employers that want to come to them.

I would try and get the Secretary of Labor to reach out to the secretaries of labor in the various States to get them to do the same sorts of things in the economic development agencies in the separate States in the United States, of which there are many, and in the technology transfer institutions in the separate States in the United States, of which there is a new one every day. It's the mission that needs to be added to the current infrastructure.

I might do something splashy, like build a national institution to attract attention on this issue, but if I did, I'd attach it to the Baldrige Award and call it the Baldrige Institute. It is—my sense of these things is the strategy is piecemeal. You need to locate a new mission in much the same way I think we were—you gentlemen and ladies were discussing with the National Science Foundation. We need to insert a set of new missions in our existing institutions that conform more to the needs of the day, both in terms of our competitive requirements and in terms of opportunities we need to build for noncollege Americans especially, and where we build new institutions, we need to insert these missions as well.

It's cheaper than bribing people to do these things if you show them how, I guess is where I come from, given the current fiscal climate.

Mr. **Olver**. So basically, I guess, if I might summarize that, you think we have the institutions set up to do it, but we just haven't—

Mr. **Carnevale**. Yes, you know, I think we have—

Mr. **Olver**.—haven't sufficiently supported them?

Mr. **Carnevale**. We haven't given them a mission that has to do with—in the case of technology, we haven't given them a mission that has to do with the installation, use, and continuous improvement in technology once it enters the workplace. The mission that they tend to have is either deep science, the development of technology, then they sort of toss it over the partition, and it goes out into the real world. We need to give them a stronger mission for helping people install and use the technology effectively.

There are lots of examples of these things and different ways to do it. The Japanese, for instance, have a system of leasing technology and cooperative relations between governments and local institutes who help work with the people who use the technology to design the technology and improve its design over time and its use over time.

It is—one of the things—I'll give you another perspective on this. In the current GATT negotiations and in our current understanding of the Japanese advantage—and I would argue there is one—over American manufacturing, to be specific about it, we've all come to the conclusion that there are basic advantages in a set of behaviors that they have. It's not so much the money they spend to invest, because—NUMMI is a fine example. Low-tech Japanese manufacturing plants are more productive than high-tech American manufacturing plants. It's not the technology, it's the use of the technology. But what we've discovered is it's a set of behaviors. It's the way their financial system cooperates with their government cooperates with the employers cooperates with their education system. It's a set of relationships among all those institutions.

The advantage is behavioral and institutional. It's not a matter of how much money they invest in anything, although it's more of the case now than in the earlier days of our competition with them.

But in any event, we as a country need to begin the slow, step-by-step process of building that infrastructure and all the relationships that come with it, and I think these bills, the reason I like them so much, is this is the sort of thing that we need to start doing. It's not terribly expensive. It's one step at a time. There is no little green pill here that's going to fix everything, as Ms. Quesada can tell you. It's one day at a time, learning how to do your job a little bit better all the time and worrying about the overall performance of the institution and not just the job you have. It's a whole set of attitudes that come with that.

So my argument is that we need to begin to build that infrastructure piecemeal.

Mr. **Olver**. Thank you very much.

Thank you for your patience, Mr. Chairman, and I just want to assure everybody that I don't have a car in Washington, D.C.

[Laughter.]

Mr. **Valentine**. Make a note of that, and we'll be sure to take his parking place back.

[Laughter.]

Mr. **Valentine**. Thanks for coming.

I have one short question, and then don't rush off, because I want to come down and speak to you all when we close down this operation.

I want to ask you, Mr. Schwarz, if you feel that in the application for the Baldrige Award there, based on your experience in that area—or indeed the rest of you—that there is an adequate way, with the questions and the other parts of that mechanism, to measure a company's involvement in the sort of thing that the lady testified about.

Mr. **Schwarz**. Two ways to answer that. The measurement, I think, is complete. What is very ambiguous, and I heard it mentioned several different ways, is I would like someplace to go to get knowledge on how to apply for the Baldrige Award other than picking up the packet and finding my way through it step by step. Baldrige is a whole lot more than answering 50 questions. It goes into the—I was somewhat involved when Motorola went for the Baldrige Award, and it's a whole philosophy that they were developing for years before they ever applied for it, where they were committing totally to quality. Mr. Galvin, Bob Galvin, had a great deal of foresight when he started into that thing, because he was already preparing for Baldrige before Baldrige was there.

And I would like this—I think you said something about a school or an institute or something that I could go and get knowledge on how to apply for Baldrige, because that would be very, very, very helpful. But the idea of Baldrige is just phenomenal simply because it promotes quality.

I bet your trucks are a lot better quality than they were before.

Ms. **Quesada**. I would say our quality is much better than it was before.

Mr. **Schwarz**. Yes. And the funny thing is, it's a whole lot easier to make it right the first time.

Mr. **Valentine**. Yes.

Mr. **Schwarz**. And a lot cheaper. Crap is really expensive.

Mr. **Valentine**. Yes. You know, the Baldrige Award, the concept originated right here in this committee. I wish I could tell you that I was the guy that thought of it, but if I didn't know that you could check on that, I might claim that.

Mr. **Schwarz**. Well, I'll congratulate you anyhow. How's that?

[Laughter.]

Mr. **Valentine**. Thank you very much. That's great.

[Laughter.]

[Letter from Alfred D. Sumberg, American Association of University Professors, follows:]

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September 17, 1991

The Honorable Tim Valentine
Chairman, House Science, Space
and Technology Subcommittee
on Technology and Competitiveness
United States House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

I write on behalf of the American Association of University Professors, the largest and oldest professional association of college and university teachers and researchers, to express our support for the principles underlying your proposed legislation, H.R.____, "National Competitive Industry Workforce Act of 1991," and Representative Price's H.R. 2936, "Technical Education and Training Act of 1991." Our primary interest in this legislation is to advance the essential educational programs that will encourage high school graduates and non-traditional students to enter and complete postsecondary programs in technical education and advanced-technology.

It is our intent to comment more specifically on this significant legislation.

We would appreciate your placing our letter of support in the hearing record for the hearing scheduled today.

Sincerely,

Alfred D. Sumberg

Alfred D. Sumberg
Associate General Secretary

BEST COPY AVAILABLE

Mr. Valentine. Well, we thank you very, very much for your contribution to the work of this subcommittee, and with that, I will declare the subcommittee adjourned.

[Whereupon, at 4:56 p.m., the subcommittee adjourned, to reconvene at the call of the Chair.]

SUBCOMMITTEE MARKUP OF H.R. 2936—TECHNICAL EDUCATION AND TRAINING ACT OF 1991 AND H.R. 3507—THE AMERICAN INDUSTRIAL QUALITY AND TRAINING ACT OF 1991

WEDNESDAY, OCTOBER 31, 1991

U.S. House of Representatives,
Committee on Science, Space, and Technology,
Subcommittee on Technology and Competitiveness,
Washington, D.C.

The Subcommittee met, pursuant to notice, at 9:35 a.m. in room 2318, Rayburn House Office Building, Hon. Tim Valentine [Chairman of the Subcommittee] presiding.

Mr. Valentine. Ladies and gentlemen, we are here today to mark up H.R. 2936, which is known affectionately as the Technical Education and Training Act of 1991, and H.R. 3507, known as the American Industrial Quality and Training Act of 1991.

H.R. 2936, introduced by our friend and colleague Mr. David Price, authorizes a new program at the National Science Foundation to build a network of advanced technology training programs in our Nation's two-year institutions of higher education. The bill recognizes two important national concerns: the first, individuals who choose not to go on to university education should be provided an alternative to underemployment. That is to say, a two-year college education that will train them in highly technical and applied skills and lead them to good-paying careers; and, secondly, a program such as this is essential to rebuild our education infrastructure in a way that reflects the reality of our international economy and global competition.

We will also be considering H.R. 3507, the American Industrial Quality and Training Act, which Mr. Lewis, the Ranking Member of the Subcommittee, and I introduced, and which is cosponsored by several other Members of the Science Committee, and perhaps others. This bill aims to enhance American competitiveness and the quality of American products by addressing the workforce training needs of our nation.

This bill authorizes programs in the Departments of Commerce, Education, and Labor. These are the Federal agencies that must grapple with our workforce training, education, and competitiveness problems on into the twenty- first century.

Our economy is changing, and it is not just a matter of becoming more "global." It is becoming a quite different economy than we had just 10 years ago. These two bills, with foresight, I believe, recognize the changing pace of the world. These bills are not for today; they are not even for tomorrow. These bills are meant to lay tracks for the future, into the future, for 10 years from now, for 30 years from now. They are, in my opinion, an essential investment in the human infrastructure of this nation. We take them very seriously.

[The prepared statement of Mr. Valentine follows:]

OPENING STATEMENT

THE HONORABLE TIM VALENTINE (D-NC)

SUBCOMMITTEE MARKUP

OCTOBER 31, 1991

TODAY, WE WILL MARK UP H.R. 2936, THE "TECHNICAL EDUCATION AND TRAINING ACT OF 1991" AND H.R. 3507, THE AMERICAN INDUSTRIAL QUALITY AND TRAINING ACT OF 1991."

H.R. 2936, INTRODUCED BY MY FRIEND AND COLLEAGUE FROM NORTH CAROLINA, MR. DAVID PRICE, AUTHORIZES A NEW PROGRAM AT THE NATIONAL SCIENCE FOUNDATION TO BUILD A NETWORK OF ADVANCED TECHNOLOGY TRAINING PROGRAMS IN OUR NATION'S TWO-YEAR INSTITUTIONS OF HIGHER EDUCATION. THE BILL RECOGNIZES TWO IMPORTANT NATIONAL CONCERNS:

-- INDIVIDUALS WHO CHOOSE NOT TO GO ON TO UNIVERSITY EDUCATION SHOULD BE PROVIDED AN ALTERNATIVE TO UNDEREMPLOYMENT: THAT IS, A TWO-YEAR COLLEGE EDUCATION THAT WILL TRAIN THEM IN HIGHLY TECHNICAL AND APPLIED SKILLS AND LEAD TO GOOD-PAYING CAREERS. AND,

-- A PROGRAM SUCH AS THIS IS ESSENTIAL TO REBUILD OUR EDUCATION INFRASTRUCTURE IN A WAY THAT REFLECTS THE REALITY OF OUR INTERNATIONAL ECONOMY AND GLOBAL COMPETITION.

WE WILL ALSO BE CONSIDERING H.R. 3507, THE "AMERICAN INDUSTRIAL QUALITY AND TRAINING ACT," WHICH I INTRODUCED AND WAS CO-SPONSORED BY MR. TOM LEWIS, AMONG OTHERS. THIS BILL AIMS TO ENHANCE AMERICAN COMPETITIVENESS AND THE QUALITY OF AMERICAN PRODUCTS BY ADDRESSING THE WORKFORCE TRAINING NEEDS OF OUR NATION.

THIS BILL AUTHORIZES PROGRAMS IN THE DEPARTMENTS OF COMMERCE, EDUCATION, AND LABOR. THESE ARE THE FEDERAL AGENCIES THAT MUST GRAPPLE WITH OUR WORKFORCE TRAINING, EDUCATION, AND COMPETITIVENESS PROBLEMS OF THE 21ST CENTURY.

OUR ECONOMY IS CHANGING, AND IT IS NOT JUST A MATTER OF BECOMING MORE "GLOBAL." IT IS BECOMING A QUITE DIFFERENT ECONOMY THAN WE HAD JUST TEN YEARS AGO. THESE TWO BILLS, WITH FORESIGHT, RECOGNIZE THE CHANGING PACE OF THE WORLD. THEY ARE NOT FOR TODAY; THEY ARE NOT EVEN FOR TOMORROW. THESE TWO BILLS ARE MEANT TO LAY TRACKS FOR THE FUTURE, FOR TEN YEARS FROM NOW...FOR THIRTY YEARS FROM NOW. THEY ARE, IN MY OPINION, AN ESSENTIAL INVESTMENT IN THE HUMAN INFRASTRUCTURE OF THIS NATION. I TAKE THEM VERY SERIOUSLY.

I WOULD NOW LIKE TO RECOGNIZE OUR RANKING REPUBLICAN MEMBER, THE DISTINGUISHED GENTLEMAN FROM FLORIDA, MR. TOM LEWIS.

Mr. **Valentine**. I would now like to recognize the distinguished Ranking Member of our Subcommittee, the gentleman from Florida, our good friend, Tom Lewis.

Mr. **Lewis**. Thank you, Mr. Chairman.

This markup is the first step of many that will be required before this legislation passes both houses. I congratulate the Chairman for his leadership in H.R. 3507, the American Industrial Quality and Training Act of 1991 and for scheduling it for markup in such a timely fashion.

I also want to express my appreciation for the bipartisan manner in which the Chairman has worked in bringing forth the legislation. For example in the spirit of bipartisan cooperation on November 7, 1991, has been tentatively set aside as the date to mark up the Morella-Thornton bill on copyrighting computer software.

Both the Technical Education and Training Act of 1991, H.R. 2936 and H.R. 3507 have as a goal the improvement of United States industrial manufacturing by enhancing technical training. If the United States is to remain competitive world-wide, in the face of dramatic global, political, and economic changes, we must have an adequately trained workforce.

I look forward to working with you, Mr. Chairman, and Representative Price and other Members of the Subcommittee to perfect the legislation before us. I urge my colleagues to support both bills.

Thank you, Mr. Chairman.

Mr. **Valentine**. Thank you very much, Mr. Lewis. The Chair recognizes at this time, the gentleman from Indiana, Mr. Roemer. Do you have an opening statement?

Mr. **Roemer**. Mr. Chairman, I do not have an opening statement. I am just here to support your leadership in these two areas. As we debated the foreign aid bill last night, my position on that bill was not that we should cut off all contact with other countries through foreign assistance, but that we should restructure that foreign assistance so that it helps our competitive position in the world. I think your two bills here help strengthen our domestic work place and workforce, Mr. Chairman.

I salute that vision that you have for the future that this is an investment in our work place and our human resources. We must begin to make that now in order to be competitive in the next century. I commend you for your leadership in that area and Mr. Lewis' leadership. I just wanted to associate myself with both your remarks this morning.

Mr. **Valentine**. We thank the gentleman for his very generous comments and for his contribution to the work of the Subcommittee on these bills and others.

The Chair recognizes at this time the gentleman from California, Mr. Rohrabacher.

Mr. **Rohrabacher**. I also have no opening statement, but just would like to also underscore my gratitude to you, Mr. Chairman, for the leadership that you are providing and would like to also underscore our commitment to the same goals. A lot of times Republicans and Democrats have the same goals, but we are talking about how we allocate the money and whether or not the money is within the budget and what processes we use to achieve those goals.

I am happy to hear that as we go about looking at the technical training for young Americans so our country can meet the challenges of the future that we are actually going about it in a way that is within the budget guidelines. In addition, some effort has been made to make sure that we are doing it in a very responsible manner.

I will be following that as well as our goals in working with you, Mr. Chairman. Thank you very much.

Mr. VALENTINE. I thank the gentleman from California, and I take note of the fact that he is uncommonly spiffy today. That is a nice outfit. Someone else obviously dressed you.

[Laughter.]

Mr. VALENTINE. No offense intended; you always look good.

We start here today with consideration of H.R. 2936, the Technical Education and Training Act of 1991, amendment in the nature of a substitute. I will ask unanimous consent that the amendment in the nature of a substitute which is before the Members of the Subcommittee be considered as original text for the purpose of this markup. If there is no objection, it is so ordered.

[The amendment in the nature of a substitute to H.R. 2936 follows:]

VALENT025

AMENDMENT IN THE NATURE OF A SUBSTITUTE FOR H.R. 2936
OFFERED BY MR. VALENTINE

Strike all after the enacting clause and insert in lieu thereof the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the ``Technical Education and Training Act of 1991''.

SEC. 2. FINDINGS.

The Congress finds that--

(1) the United States is at a disadvantage in the competitive global economy because our workforce is ill-trained for the technologically advanced modern workplace;

(2) our position in the world economy faces ever greater challenges from highly trained foreign competition and will be further undermined as the ratio of active American workers to retirees continues to fall;

(3) the United States increasing dependence on foreign producers for advanced-technology products threatens not only our economic independence, but our national security as well;

(4) the improvement of our workforce's productivity and our international economic position depend upon the

substantial upgrading and coordination of our educational efforts in science, mathematics, and technology, especially at the associate-degree level;

(5) efforts to address the shortages of technically trained workers in a wide variety of fields demands a national strategy to intensify collaboration among the Nation's associate-degree granting colleges, private industry, and labor to train skilled, advanced technicians; and

(6) the National Science Foundation's traditional role in developing model curricula, disseminating instructional materials, enhancing faculty development, and stimulating partnerships between educational institutions and industry, makes an enlarged role for the National Science Foundation in technical education and training particularly appropriate.

SEC. 3. TECHNICAL EDUCATION AND TRAINING.

(a) NATIONAL ADVANCED TECHNICAL EDUCATION AND TRAINING PROGRAM.--(1) The Director of the National Science Foundation (hereafter in this Act referred to as the ``Director'') shall carry out an advanced technical education and training program under which accredited associate-degree-granting colleges, using matching non-Federal funds, will provide educational training in technical competencies in strategic fields. Such program shall include emphasis on collaborative programs with local employers and technical occupational training and shall place emphasis on attracting men and women to the program who are nontraditional students who desire to upgrade or acquire new and advanced occupational skills, and persons who have recently completed high school or who left high school prior to graduation. The program shall establish, strengthen, and expand the technical education and training capabilities of associate-degree-granting colleges through such methods as--

(A) the development of associate degree and training programs in advanced-technology occupations by accredited associate-degree-granting colleges, and by consortia of such colleges, with particular emphasis on model instructional programs to prepare and upgrade technicians and to retrain other workers in state-of-the-art competencies in advanced-technology occupations;

(B) the development in such colleges of faculty and instructors, both full- and part-time, in advanced-technology fields such as laser technology, electronics, robotic technology, nuclear technology, computer technology, and fiber optics, advanced manufacturing technology, advanced health technologies, and in advanced-technology applications that integrate and synthesize emerging and existing technologies;

(C) the establishment of innovative partnership

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arrangements among associate-degree-granting colleges, the private sector, and the government to enhance the exchange of technical and scientific personnel, including programs providing faculty opportunities to have short-term assignments with industry;

(D) the development of cooperative advanced technical education and training programs with business, industry, labor, and government;

(E) the purchase or lease of state-of-the-art instrumentation essential to training and education programs designed to prepare and upgrade technicians in advanced-technology fields;

(F) the stimulation of private sector participation in advanced technical education and training programs in associate-degree-granting colleges through the sharing of program costs, equipment loans, and donations, and the cooperative use of laboratories, plants, and other facilities as training sites, and provision for relevant state-of-the-art work experience opportunities for students enrolled in such programs; and

(G) the development and dissemination of instructional materials in support of advanced technical education and training programs in associate-degree-granting colleges.

(2) In carrying out the national advanced technical

education and training program, the Director shall--

(A) award grants on a competitive basis to accredited associate-degree-granting colleges which demonstrate the ability to provide competency-based technical training; and

(B) work with the Nation's network of associate-degree-granting colleges to establish and maintain, at the National Science Foundation or by contract, a readily accessible inventory of advanced technical education and training programs which are serving public and private employers and addressing the changing workforce demands of technology.

(3) Each college awarded a grant under this subsection shall provide an associate degree training program in designated advanced-technology occupational fields in accordance with the provisions of this section.

(4) The National Science Foundation shall prepare and submit directly to the Congress, without review by the Office of Management and Budget, an annual report on the national advanced technical education and training program under this subsection, together with--

(A) a review and evaluation of the effectiveness of the program;

(B) a catalog of the associate-degree-granting college programs identified by the inventory required under paragraph (2)(B);

(C) a recommendation on the feasibility of expanding the program; and

(D) such other recommendations, including recommendations for legislation, as the Director considers necessary.

(5) In carrying out this subsection, the Director shall consult, cooperate, and coordinate with the programs and policies of the Department of Commerce and other relevant Federal agencies including the Departments of Labor, Education, and Defense.

(6) The national advanced technical education and training program shall give emphasis to training programs described in paragraph (3) which--

(A) include flexibility in scheduling in order to accommodate working people and parents; and

(B) take steps to meet the adaptive and training needs of handicapped young people and adults.

(b) NATIONAL CENTERS OF TECHNICAL EDUCATION AND TRAINING.--The Director shall designate 10 centers of excellence among associate-degree-granting colleges. The centers shall be--

(1) associate-degree-granting colleges with exceptional programs of advanced technical education and training;

(2) associate-degree-granting colleges that excel in undergraduate education in mathematics and science; or

(3) both (1) and (2),

and shall serve as national and regional clearinghouses and models for the benefit of both colleges and secondary schools. Centers designated under this subsection shall be geographically distributed and chosen by a competitive application process from among colleges that will provide operating resources, in cash or in kind, equal in value to the amount of the Federal grants made under this subsection.

(c) DEFINITIONS.--As used in this section--

(1) the term ``advanced-technology'' includes or refers to advanced technical activities such as the modernization, miniaturization, integration, and computerization of electronic, hydraulic, pneumatic, laser, nuclear, chemical, telecommunication, and other technological applications to enhance productivity improvements in manufacturing, communication, transportation, commercial, and similar economic and national security activities; and

(2) the term ``associate-degree-granting college'' means a regionally-accredited postsecondary educational institution that has authority to award an associate degree or comparable technical certificate and has the mission of offering comprehensive education and training

services to meet the needs of a prescribed community, including a two-year junior college, community college, technical institute, or other postsecondary institution offering comprehensive associate-degree programs in technical fields.

(d) ARTICULATION PARTNERSHIPS.--

(1) PLANNING GRANTS.--The Director shall make planning grants to associate-degree-granting colleges to enable such colleges to negotiate the establishment of partnerships with 4-year academic institutions or secondary schools.

(2) PARTNERSHIP GRANTS.--(A) The Director shall make grants to eligible partnerships to assist associate-degree-granting colleges and 4-year academic institutions in helping students to transition from associate-degree-granting colleges to 4-year academic institutions to enable such students to achieve bachelor degrees in mathematics, science, engineering, or technology.

(B) Grants made under this paragraph shall be awarded on a competitive, merit basis.

(C) Each eligible partnership receiving a grant under this paragraph shall--

(i) examine curricula to ensure that academic credit earned at the associate-degree-granting

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college will be transferable to the 4-year academic institution or institutions;

(ii) brief teachers from the associate-degree-granting college on the specific requirements of courses at the 4-year academic institution or institutions when necessary to facilitate curriculum compatibility between the institutions;

(iii) facilitate the admittance and expedite academic credit transfers of students matriculating from the associate-degree-granting college to the 4-year academic institution or institutions;

(iv) provide special counseling for students to encourage and facilitate student transfers from the associate-degree-granting college to the 4-year academic institution or institutions, including counseling targeted at women and minority students;

(v) conduct workshops at the associate-degree-granting college to acquaint students with the opportunities, requirements, and available financial aid of the 4-year academic institution or institutions;

(vi) provide special tours and orientation visits to the facilities of the 4-year academic institution or institutions for students from the associate-degree-granting college, including the opportunity to observe laboratory demonstrations and experiments, and experience hands-on interaction with equipment and instrumentation;

(vii) provide special summer programs for students from the associate-degree-granting college to encourage such students' subsequent matriculation at the 4-year academic institution or institutions; and

(viii) provide special ongoing counseling for any graduates of the associate-degree-granting college who have matriculated at the 4-year academic institution or institutions.

(3) OUTREACH GRANTS.--The Director shall make grants to associate-degree-granting colleges for the purpose of developing and strengthening partnerships in mathematics and science education with secondary schools in the community served by the college. These grants shall be made by a competitive application process from among colleges that will provide operating resources, in cash or in kind, equal in value to the amount of the Federal grants made under this paragraph.

(4) GEOGRAPHIC DISTRIBUTION.--In awarding grants under this subsection, the Director shall ensure an equitable geographic distribution of such grants.

(5) APPLICATION.--Each associate-degree-granting college or eligible partnership desiring a grant under this subsection shall submit an application to the Director at such time, in such manner, and accompanied by such information, as the Director may reasonably request.

(6) DEFINITIONS.--As used in this subsection--

(A) the term ``4-year academic institutions'' means colleges, universities, and institutes of technology that award bachelor degrees in mathematics, science, or engineering, or a 4-year technology degree; and

(B) the term ``eligible partnership'' means one or more associate-degree-granting colleges in partnership with at least one but not more than four 4-year academic institutions.

SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated to the National Science Foundation for carrying out this Act $50,000,000 for fiscal year 1992 and such sums as may be necessary for fiscal years 1993 through 1996.

Mr. **Valentine**. I will recognize Jim Dietz at this time, and ask him to give us an explanation of H.R. 2936. The bill has been explained to the Members. It has been circulated, but I think it is appropriate to give us a brief explanation, please, sir.

Mr. **Dietz**. Thank you, Mr. Chairman.

H.R. 2936 is the Technical Education and Training Act of 1991. It is composed of three major segments. The first is the National Advanced Technical and Education Training Program, which authorizes the National Science Foundation to establish programs to fund technical education programs at the Nation's community colleges.

The second section, the National Centers of Technical Education and Training, establishes centers of excellence, or models, in the Nation's associate degree granting institutions of higher education for the purpose of furthering technical education and undergraduate science and mathematics education.

Finally, the Associate Degree Granting College and University Partnerships Program is established for the purpose of aiding communication and articulation between education levels from two to four-year institutions and from high school to two-year institutions.

Mr. **Valentine**. Thank you, sir.

Before I get to the amendments or questions, I have been joined by other Members of the Subcommittee. I would like to give them an opportunity to make opening statements, if they so desire.

The gentleman from Massachusetts, Mr. Olver, do you have an opening statement or comment?

Mr. **Olver**. Thank you, Mr. Chairman. I do want to make a brief opening statement. I do want to express my appreciation to you for your leadership on this important subject, both demonstrated in the legislation that is before us to and in the markup and in the hearing that we had last month.

I also want to thank Mr. Price for his leadership on the legislation, for working with me to address some concerns of mine, and I hope, in making the reach and the effectiveness of the bill somewhat greater.

I am cosponsoring both of the bills. I believe they are important initiatives in what have become great needs for increased technical education and training. The Commission of the Skills of the American Workforce was quite clear in the choice facing us as a country. We have to increase our workforce skills, or be forced into a losing battle with low- wage companies.

We need to improve the technical education and training being offered in the schools and colleges and manufacturing firms. Together these bills, I think, represent a very significant step in improving the Country's industrial competitiveness.

Again, I would just thank you, Mr. Chairman, for highlighting the need for this legislation and bringing these bills before us.

Mr. **Valentine**. I thank the gentleman.

The Chair recognizes the gentleman from Maryland, Mr. Gilchrest.

Mr. **Gilchrest**. Thank you, Mr. Chairman. Just a few words.

I think we are moving in the right direction. I have said before in this committee that knowledge is our destiny and if we can make the connection between the schools, the funding, and the students for those activities that are appropriate that can provide the students with a solid foundation for a good career and security and increase our competitiveness then we are on the right road.

The true most important infrastructure of this country is education. This is a great bill. Thank you, Mr. Chairman.

Mr. VALENTINE. I thank the gentleman.

We recognize at this time the gentleman from Arkansas, Mr. Thornton, who recently comes from the battlefield effort to keep order in the House over the past few hours, Mr. Thornton.

Mr. THORNTON. Thank you, Mr. Chairman. I just want to express my appreciation for your bringing forward these important measures for our consideration and to offer my full support in obtaining their passage in the House. Thank you.

Mr. VALENTINE. Thank you, sir.

The Chair recognizes at this time, the gentleman from Pennsylvania, Dr. Ritter.

Mr. RITTER. Thanks very much, Mr. Chairman. I want to thank you for your leadership in this area. There has been a lot of talk in Washington recently about how a broad range of public policy should be structured to make America more competitive. While I think it is true that many changes are needed, I also know that even the wisest, best coordinated, most widely accepted public policies could not make American firms competitive if, if they did not practice quality methods and principles.

While public policies are instrumental in shaping the competitive environment of American business, and are extremely important, the practice of quality in the work place is what most determines whether American companies are competitive on the factory floor and in the field. In the 1980s manufacturers found themselves besieged by Japanese and other foreign competitors. They groped for new ways of doing business, new technologies, new answers. Gradually a fundamental choice began to emerge: either get better or get beat.

Education is absolutely crucial to achieving quality in the workforce. The two bills on which we are to vote today provide some good examples of helping America get better by providing the type of education and training needed by our students to qualify for jobs in a competitive global economy.

The Chairman's National Competitive Industry Workforce Act would help bolster and improve substantially the realism of youth training in manufacturing and technology based firms. This program would focus on the Federal Government on some programs that are being pioneered in a growing number of states. The bill would also encourage private companies to enter in a partnership with institutions that provide education and training in total quality techniques.

It is gratifying for me to see this type of proposal. If we are ever going to develop a true culture of quality, we are going to have to start by getting our young people on board while they are still in their most impressionable and formative years.

Mr. Chairman, on the way to the final product, I would hope to work with you. I have some concerns about the vocational, technical education institutions being used with this legislation in mind to their maximum. We shouldn't be reinventing wheels. But I think these are just perfecting amendment possibilities. I think there is plenty there in the legislation to lead us in the right direction.

Mr. Chairman, I want to thank you again for your leadership and yield back the balance of my time.

Mr. **Valentine**. I thank the gentleman for that statement and for his contribution.

The lady from Maryland, Mrs. Morella.

Mrs. **Morella**. Thank you, Mr. Chairman. I am delighted to be able to indicate strong support for both of these pieces of legislation before us for the markup. I want to also thank Mr. Lewis for comments that he made earlier, too, and reiterate the fact that we on this subcommittee and full committee work in a bipartisan way for the benefit of our country. Indeed, these two bills are an example of that.

I am delighted, Mr. Chairman, that your bill would set up a technical apprenticeship program for young people to help us with a skilled workforce, with also establishing workforce quality partnerships in the United States, and that Mr. Price's bill will deal with strengthening the community college effort in terms of technical education with the National Science Foundation. They both are going to really make this Subcommittee on Technology and Competitiveness, indeed, fulfill what the title implies.

Thank you, Mr. Chairman.

Mr. **Valentine**. We thank you for your assistance with this and other measures and for that statement.

I recognize the lady from Missouri, Ms. Horn.

Ms. **Horn**. Thank you, Mr. Chairman. Since I just arrived, I will not presume to do that, but I do appreciate being here and I do appreciate this markup and these wonderful bills that I have had an opportunity to work on.

Mr. **Valentine**. So you can pop into this subcommittee and you get recognized right away.

The bill is now open for amendments. I will recognize Mr. Lewis at this time for his amendment and his explanation.

Mr. **Lewis**. Thank you, Mr. Chairman. I have an amendment to H.R. 2936, in fact, I have four amendments. I ask unanimous consent that I be allowed to offer them en bloc.

Mr. **Valentine**. Without objection, so ordered. I assume that every Member has a copy of the amendments.

Mr. **Lewis**. Mr. Chairman, the first amendment makes it clear that funding is to come from otherwise authorized programs for fiscal year 1992. Therefore, H.R. 2936 does not authorize new money and does not add to the Federal deficit problem.

The first amendment also establishes that the maximum for funding for fiscal years 1993 through 1996 will be the same as that for fiscal year 1992.

The second amendment removes a restriction that OMB must be bypassed when NSF submits a report to Congress. This is dropped because the expected objections by the Administration.

The third amendment leaves up to the discretion of NSF to recommend legislation rather than mandating the recommendation.

The fourth amendment adds the flexibility that the Director of NSF may provide additional support that is not otherwise covered in the legislation.

Mr. Chairman, I believe that these amendments have been reviewed and cleared both by Members of the majority and the minority.

[The amendments offered by Mr. Lewis follow:]

Amendment to the Amendment in the Nature of a Substitute for H.R. 2936

offered by Mr. Lewis

Amendment 1.

On page 11, lines 18 through 20, strike, "for fiscal year 1992 and such sums as may be necessary for fiscal years 1993"

And insert in lieu thereof:

",from sums otherwise authorized by be appropriated, for each of the fiscal years 1992"

Amendment 2.

On page 5, strike lines 17 through 21 and insert in lieu thereof:

"(4) The National Science Foundation shall submit to the Congress an annual report on the national advanced technical education and training program under this subsection, together with"

Amendment 3.

On page 6, strike lines 4 through 6 and insert in lieu thereof:

"(D) such other recommendations as the Director considers necessary."

Amendment 4.

On page 10, line 9, strike "and"

On page 10, line 13, strike "." and insert in lieu thereof:

";and" and add the following new subparagraph:

"(ix) provide additional support as deemed necessary by the Director."

Mr. **Valentine**. Are there any questions? Is there any discussion? If not, the Chair puts the question. All those in favor of the amendments en bloc introduced and described by Mr. Lewis will signify by saying aye.

[Chorus of ayes.]

Mr. **Valentine**. Those opposed, no.

[No response.]

Mr. **Valentine**. The ayes have it. The amendments are agreed to. Are there any further amendments?

The Chair recognizes at this time Mr. Lewis for the purposes of a motion.

Mr. **Lewis**. Mr. Chairman, I move that the subcommittee report the bill, H.R. 2936, as amended, and instruct the staff to prepare a legislative report and make technical and conforming amendments and that the Chairman take all necessary steps to bring the bill before the Committee for its due consideration.

Mr. **Valentine**. You have heard the motion. Is there any debate? If not, the Chair will put question. All those in favor of the motion will signify by saying aye.

[Chorus of ayes.]

Mr. **Valentine**. Opposed, no.

[No response.]

Mr. **Valentine**. The ayes have it. The motion is carried.

We will now move to consideration of H.R. 3507, The American Industrial Quality and Training Act of 1991. I will ask Jim Dietz if he will explain the bill at this point.

Mr. **Dietz**. Thank you, Mr. Chairman. H.R. 3507 is the American Industrial Quality and Training Act of 1991. It established five major activities in the Departments of Labor, Commerce, and Education.

The first activity is the use of technical apprenticeship program which is a program for the Department of Labor to bridge the gap between technical education and jobs.

The second activity is the American Workforce Quality Partnerships. This is a partnerships program between institutions of higher education and private sector firms in order to further the concepts of total quality through technical education and workforce training.

Third program is called the State Technical Education and Training Networks. This program authorizes the Department of Education to give grants to State governments on a competitive basis to develop plans and strategies to unify their workforce training and technical education programs.

The fourth activity directs the Department of Labor to gather national statistics on workforce training.

And the fifth activity asks that the Department of Education and the Department of Commerce to, together, study the possibilities of applying the concepts of total quality management to institutions of higher education and secondary schools.

[A copy of H.R. 3507 follows:]

The markup vehicle will be adjusted to include the following change:

Beginning on page 13, line 3, strike Sec. 4

Renumber the following sections .

102D CONGRESS
1ST SESSION

H. R. 3507

I

To establish programs under the Technology Administration of the Department of Commerce, and elsewhere, to promote a skilled workforce and United States industrial competitiveness.

IN THE HOUSE OF REPRESENTATIVES

OCTOBER 3, 1991

Mr. VALENTINE (for himself, Mr. BROWN, Mr. LEWIS of Florida, Mr. MINETA, Mr. PRICE, Mr. THORNTON, Mr. BOEHLERT, Mr. JONES of North Carolina, Mr. GLICKMAN, Mr. HENRY, Mr. JEFFERSON, Ms. HORN, Mr. OLVER, Mr. LANCASTER, Mr. BACCHUS, and Mr. TORRICELLI) introduced the following bill; which was referred jointly to the Committees on Education and Labor, Energy and Commerce, and Science, Space, and Technology

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A BILL

To establish programs under the Technology Administration of the Department of Commerce, and elsewhere, to promote a skilled workforce and United States industrial competitiveness.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "American Industrial Quality and Training Act of 1991".

SEC. 2. FINDINGS AND PURPOSE.

(a) FINDINGS.—The Congress makes the following findings:

(1) The position of the United States in the world economy faces ever greater challenges from highly trained foreign competition and will be undermined in years to come as more and more nations provide advanced industrial and technical skills training for their workforce as a matter of government policy.

(2) For the past 20 years, the economy of the United States has grown through a large expansion in the labor force. In the 1990s, the population of the United States is expected to grow at a rate slower than any time since the 1950s. As a result, American industry will have to achieve vastly greater productivity rates in order to fuel economic expansion.

(3) Few primary job opportunities are available for noncollege-bound youth; instead they settle into low-wage, low-skill, secondary labor market jobs for a period of several years before advancing to more career-oriented positions.

(4) Fifty percent of our nation's graduating high school seniors do not pursue postsecondary education and nearly 25 percent of all high school stu-

dents drop out altogether, due, in part, to a lack of career relevance of their high school education.

(5) Presently, the United States has no formal system to provide noncollege-bound youth with opportunities to develop advanced skills for the modern workplace; instead, as a nation, we try to meet our workforce training needs through many individual, disconnected programs.

(6) Experts estimate that between two-thirds and three-quarters of the workforce of the year 2000 is already working today, demonstrating the need to train and retrain our existing workforce.

(7) In more than 10 nations, average wages are now higher than in this country, where average wages have dropped in real terms by 6 percent since 1980.

(8) The United States, Germany, Sweden, and Japan all face competition from low-wage nations; however, while Germany and Japan have enjoyed highly positive trade balances, and Sweden's has been roughly neutral, the United States has been running large negative balances for more than 6 years.

(9) Some United States companies have been very successful at furthering their competitive posi-

tions through a renewed attention to worker training, the redefinition of worker responsibilities, and the adoption of total quality or similar competitiveness-oriented strategies.

(10) The Federal Government does not keep complete, comprehensive statistics on worker training, which contributes to our inability to raise national corporate awareness as to the importance of investing in human resources.

(b) PURPOSE.—It is the purpose of this Act—

(1) through apprenticeship-like experiences, to provide America's youth with advanced industrial, technological, and management skills in order to further industrial global competitiveness and provide the Nation's young people with an opportunity to achieve high living standards;

(2) to encourage private sector United States manufacturing and technology-based enterprises to adopt total quality management practices and such other strategies as may further global competitiveness;

(3) to further the ability of community and technical colleges and other 2-year institutions of higher education to educate and train individuals

who wish to pursue advanced technological and industrial skills;

(4) to encourage State governments to restructure and fully develop their technical education and technician training activities into unified State-wide systems that respond to the social, technological, and economic needs of localities and the State;

(5) to collect, in a systematic way, statistics on the annual expenditure of United States companies on formal worker training programs; and

(6) to study the feasibility of applying the concepts of total quality management to the operation of secondary and postsecondary educational institutions.

SEC. 3. AMERICAN WORKFORCE QUALITY PARTNERSHIPS.

(a) PROGRAM AUTHORIZED.—The Secretary of Commerce, through the Technology Administration, is authorized to make grants to eligible applicants having applications approved under this section to establish and operate American workforce quality partnership programs in accordance with the provisions of this section. The Secretary of Commerce shall award grants on a competitive basis to pay the Federal share for American workforce quality partnership programs to establish workforce training consortia between industry and institutions of higher education.

(b) GRANT PERIOD.—Grants awarded under this section may be for a period of 5 years.

(c) GENERAL AUTHORITY.—Each grant recipient shall use amounts provided under the grant to develop and operate an American workforce quality partnership program.

(d) CONTENTS OF PROGRAM.—An American workforce quality partnership program shall establish partnerships between one or more technology-based or manufacturing sector firms and a local community or technical college or other appropriate institutions of higher education to train and educate a significant proportion of the employees of the industrial partners at all organizational levels through both workplace-based and classroom-based programs of training.

(e) FEDERAL SHARE.—The Federal share of the cost of an American workforce quality partnership program may not exceed 50 percent of the total cost of the program. The non-Federal share of such costs may be provided in-cash or in-kind, fairly valued. The total contribution of the proposed partnership should reflect a substantial contribution on the part of the industrial partners and appropriate contributions of the education partners, local or State governments, and other appropriate entities.

(f) APPLICATIONS.—

(1) IN GENERAL.—Each eligible applicant that desires to receive a grant under this section shall submit an application to the Secretary of Commerce at such time and in such manner as the Secretary shall prescribe.

(2) PLAN.—Each application submitted under this subsection shall contain a plan for the development and implementation of an American workforce quality partnership program under this section. Such plan shall—

(A) show a demonstrated commitment, on the part of the industrial partners, to substantially restructure its organization by adopting high performance or total quality management strategies or other plausible strategies to renew its competitive edge;

(B) demonstrate the need for Federal resources because of the long-term nature and risk of such a restructuring investment, the inability to finance such ventures because of the high cost of capitalization, intense competition from foreign industries, or such other appropriate reasons as may limit the industrial partners' ability to launch restructuring programs where worker training and development is a substantial component;

(C) demonstrate long-term benefit for all partners and the local economy, through an enhanced competitive position of the industrial partners, substantial benefits for regional employment, and the ability of the education partners to further their capabilities to educate and train other nonpartnership-affiliated individuals wishing to obtain or upgrade technical, technological, industrial management and leadership, or other industrial skills;

(D) make full, appropriate, and innovative use of industrial and higher education resources and other local resources such as facilities, equipment, personnel exchanges, experts, or consultants to establish a quality partnership which reflects local, State, or regional economic development priorities or policies;

(E) provide for the establishment of an advisory board in accordance with subsection (h);

(F) contain a strategic plan for the training partnership; and

(G) include an explanation of the industrial partners' plans to adopt new competitive strategies and how the training partnership aids that effort.

(3) APPROVAL.—The Secretary of Commerce shall approve applications based on their potential to create an effective American workforce quality partnership program in accordance with this section.

(A) CRITERIA.—In reviewing grant applications, the Secretary of Commerce shall give significant consideration to the following criteria:

(i) Saliency of argument for requiring a Federal investment.

(ii) Commitment of partnership to continue operation after the termination of Federal funding.

(iii) The likelihood that the competitive strategy will lead to long-term competitiveness of the industrial partners and contribute positively to economic or industrial competitiveness.

(iv) The likelihood that the partnership will benefit the education mission of the education partners in ways outside of the scope of the partnership, such as developing the infrastructure or capability to train other nonpartnership-affiliated individuals in similar skills.

(B) PRIORITY CONSIDERATION.—The Secretary of Commerce shall give priority consideration to industries which are threatened by intense foreign competition important to the long-term national economic or military security of the United States and industries which are critical in enabling other United States industries to maintain a healthy competitive position.

(g) USE OF FUNDS.—

(1) APPROVED USES.—Federal funds may be used for—

(A) the direct costs of workplace-based and classroom-based training and education in advanced technical, technological, industrial management and leadership, or other industrial skills; basic literacy and remedial instruction in reading and mathematics; and training for the implementation of high performance or total quality management strategies, or other competitiveness strategies contained in the strategic plan;

(B) the purchase or lease of equipment for the purpose of instruction or other instructional resources and materials to aid in education and training or personnel exchanges between the education and industrial partners;

(C) the development of in-house curricula or coursework or other training-related programs;

(D) appropriate salary compensation of the education and industrial partners assigned to or employed by the partnership for the purpose of instruction, training, or the support thereof, and any other experts or consultants which are retained for similar purposes; and

(E) reasonable administrative expenses and other indirect costs of operating the partnership which may not exceed 20 percent of the total cost of the program.

(2) LIMITATIONS.—Federal funds may not be used for nontraining related costs of adopting new competitive strategies including the replacement of manufacturing equipment, product redesign and manufacturing facility construction costs, or salary compensation for the time spent in a learning capacity by employees of the industrial partners.

(h) ADVISORY BOARD.—

(1) Each partnership shall establish an advisory board which shall include representation from multiple organizational levels of the industrial partners, the education partners, labor union representatives if a unionized workforce, and such other representatives and experts as may be appropriate or necessary.

(2) The advisory board shall—

(A) advise the partnership on the general direction and policy of the partnership including training, instruction, and other related issues;

(B) report to the Secretary of Commerce after the second and fourth year of the program, on the progress and status of the partnership, including its strengths, weaknesses, and new directions; and

(C) assist in the revision of the strategic plans (submitted with the application under subsection (f)(2)(F)) and include such revised plans in the reports under subparagraph (B).

(i) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated $50,000,000 for fiscal year 1992 and such sums as may be necessary for each of the fiscal years 1993, 1994, 1995, and 1996 to carry out the purposes of this section.

SEC. 4. AMERICAN INDUSTRIAL QUALITY FOUNDATION.

(a) PROGRAM AUTHORIZED.—The Secretary of Commerce shall establish, in the Technology Administration, the American Industrial Quality Foundation (hereafter in this section referred to as the "Foundation"), for the purpose of furthering the ability of United States industry to compete in the international marketplace.

(b) FUNCTIONS.—The Foundation shall—

(1) identify best practices, through experience under American workforce quality partnership programs under section 3, the Malcolm Baldrige National Quality Award, or otherwise;

(2) determine whether the dissemination of best practices identified under paragraph (1) would be in the interest of the United States;

(3) disseminate information and advice about best practices identified under paragraph (1) that are determined under paragraph (2) to be in the interest of the United States; and

(4) provide classes, seminars, and conferences on various topics on industrial competitiveness, including—

(A) competitiveness strategies;

(B) worker training;

(C) the Malcolm Baldrige National Quality Award;

(D) export strategies;

(E) labor management relations; and

(F) production technology.

(c) DIRECTOR.—The Secretary of Commerce shall appoint a Director for the Foundation.

(d) STAFF.—(1) The Foundation shall be staffed by—

(A) employees of the Department of Commerce;

(B) employees of the Department of Defense, the Department of Energy, the Department of Labor, the National Aeronautics and Space Administration, the Environmental Protection Agency, the National Science Foundation, or other appropriate Federal entities, on temporary assignment;

(C) employees of State and local governments, labor organizations, nonprofit industry organizations, professional associations, and other organizations the Director considers appropriate, on temporary assignment;

(D) private sector firms and industrial research consortia, on temporary assignment;

(E) faculty from institutions of higher education, on temporary assignment; and

(F) such additional full-time employees as the Director considers necessary.

(2) The Director shall attempt to ensure, by requesting temporarily assigned personnel from various organizations and through full-time personnel hiring practices, that the Foundation is staffed by a variety of individuals representing each of the organizations described in paragraph (1) (A) through (F).

(e) ADVISORY COMMITTEE.—The Secretary of Commerce shall establish an advisory committee to guide the Foundation on matters of general policy and long-range planning. In appointing members of the advisory committee, the Secretary shall ensure that the organizations described in subsection (d)(1) (A) through (F) are appropriately represented. Each member of the advisory committee shall receive travel expenses, including per diem in lieu of subsistence, in accordance with sections 5702 and 5703 of title 5, United States Code.

(f) USER FEE.—The Foundation may establish and charge fees for services it performs, in amounts that reasonably reflect the costs to the Foundation of performing such services, and may retain and use the proceeds from the collection of such fees for performing such services.

The Director may, in special circumstances, waive the application of such fees.

(g) DEFINITION.—For purposes of this section, the term "best practice" means a strategy, method, technique, or process that has been found through experience to be useful in furthering the ability of industry to compete.

(h) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary of Commerce $10,000,000 for fiscal year 1992, and such sums as may be necessary for each of the fiscal years 1993 through 1996, for carrying out this section.

SEC. 5. YOUTH TECHNICAL APPRENTICESHIP PROGRAMS.

(a) PROGRAM AUTHORIZED.—The Secretary of Labor is authorized to make grants to eligible applicants having applications approved under this section to establish programs to be known as youth technical apprenticeship programs in accordance with the provisions of this section. The Secretary of Labor shall award grants on a competitive basis to pay the Federal share for youth technical apprenticeship programs.

(b) GENERAL AUTHORITY.—Each grant recipient shall use amounts provided under the grant to develop and operate a youth technical apprenticeship program.

(c) CONTENTS OF PROGRAM.—A youth technical apprenticeship program shall—

(1) establish 3- or 4-year apprenticeship-like programs consisting of 2 years of secondary school preceding graduation and 1 or 2 years of post-secondary education with a common core of proficiency in mathematics, science, social science, and English and more applied technical, technological, industrial management and leadership, or other industrial skills designed to lead to an associate degree or other certificates of technical skills accomplishment;

(2) provide youth with stipended or salaried rotational work assignments within a specific manufacturing or technology-based company for the length of the program period for the purpose of broadly training youth in a variety of related technical, technological, industrial management and leadership, or other industrial skills;

(3) ensure that classroom and apprenticeship-like experiences are well coordinated, complementary, and relevant;

(4) make allowance and provision for those youth who may desire to advance to 4-year institutions of higher education, in lieu of career entry, upon successful completion of the apprenticeship-like experience;

(5) broadly educate and train youth program participants for skilled primary occupations in a variety of areas;

(6) be designed to have a substantial impact in terms of the number of students affected or geographic region served by the program;

(7) demonstrate a commitment to continue operation after termination of Federal funding;

(8) contribute substantially to the ability of local industry participants to obtain appropriately trained workers;

(9) be developed in accordance with local or regional economic development policies and with advice from appropriate local and State entities; and

(10) establish an advisory board in accordance with subsection (f).

(d) APPLICATIONS.—

(1) ELIGIBLE APPLICANTS.—Youth technical apprenticeship grants shall be awarded to nonprofit organizations representing labor, industry, or education or consortia of such organizations, or other appropriate entities as determined by the Secretary of Labor for periods of not more than 4 years.

(2) IN GENERAL.—Each eligible applicant that desires to receive a grant under this section shall

submit an application to the Secretary of Labor at such time and in such manner as the Secretary shall prescribe.

(3) PLAN.—Each application submitted under this subsection shall contain a plan for the development and implementation of a youth technical apprenticeship program under this section. The plan shall include an explanation of how the program will continue to operate after the termination of Federal funds.

(4) APPROVAL.—The Secretary of Labor shall approve applications based on their potential to create an effective youth technical apprenticeship program in accordance with the provisions of this section.

(5) SPECIAL CONSIDERATION.—The Secretary of Labor shall give special consideration to applications which provide for the contribution of non-Federal funds.

(e) PLANNING GRANTS.—The Secretary of Labor shall award one time, one-year planning grants on a competitive basis to eligible applicants to apply for youth technical apprenticeship program grants, to develop full-scale plans and proposals for the program, and for other planning costs associated with applying for such grants and developing such programs. No planning grant under this subsection may exceed $50,000. At the discretion of the Secretary of Labor, planning grants may be awarded to organizations for the purpose of planning local youth apprenticeship programs not funded under this section.

(f) ADVISORY BOARD.—

(1) ESTABLISHMENT AND FUNCTIONS.—Each entity that is awarded a grant under subsection (d) shall establish an advisory board. The advisory board shall advise the youth technical apprenticeship program on general direction and policy.

(2) MEMBERSHIP.—An advisory board shall be composed as follows:

(A) 75 percent of the membership shall be individuals representing the secondary school systems, institutions of higher education, and companies that participate in the program and shall include at least one youth apprentice, and one representative from the grant recipient organization to serve ex-officio.

(B) 25 percent of the membership shall be individuals who are representative of groups not directly affiliated with the program but who have knowledge and expertise in the area of education, business and management, and technology or other relevant areas, such as educational experts, experts involved in the operation of other nonfederally funded apprenticeship programs, and officers and employees of State or local government.

(3) ANNUAL REPORT.—The advisory board shall submit annually to the Secretary of Labor a report concerning the progress, status, strengths, and weaknesses of the apprenticeship program.

(g) USE OF FUNDS.—

(1) Federal funds under this section may not be used to pay any stipend or salary to a participant in a youth technical apprenticeship program.

(2) Federal funds may be used for the following purposes:

(A) The development of complementary programs of study between participating secondary and postsecondary institutions of education including coursework, seminars, student counseling, and mentorship.

(B) The development of industrial work programs that are well coordinated with student classroom experiences.

(C) Direct and indirect costs associated with the expenses of operating the program.

(h) CLEARINGHOUSE.—The Secretary of Labor, together with other appropriate entities, shall establish and maintain at the Department of Labor, or by contract, a readily accessible inventory of youth apprenticeship programs in the United States for the use of individuals or organizations that wish to learn more about or establish youth apprenticeship programs.

(i) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated $50,000,000 for fiscal year 1992 and such sums as may be necessary for each of the fiscal years 1993, 1994, 1995, and 1996 to carry out the purposes of this section.

SEC. 6. STATEWIDE TECHNICAL EDUCATION AND TRAINING NETWORKS.

(a) GENERAL AUTHORITY.—The Secretary of Education is authorized to make grants on a competitive basis to State governments to pay the Federal share of the cost of programs under subsection (b).

(b) CONTENTS OF PROGRAM.—The Secretary of Education shall make grants to establish statewide technical education and training networks to develop plans or strategies to establish statewide systems for the provision of technical, technician, or technological skills and education by building upon Federal, State, and local programs through such methods as—

(1) reviewing the extent to which articulation agreements are used and can be used between 2- and 4-year institutions of higher education and between high schools and work-based learning, vocational, and technical skill and education programs in order to provide effective links between education levels;

(2) the examination of existing programs or the exploration of new programs to fill training needs that currently go unmet or serve populations which are currently underserved;

(3) the evaluation and review of programs with the intention of identifying the most effective and efficient means to achieve training goals;

(4) efforts to encourage renewed cooperation of the private sector in assisting in programs that fulfill the training needs of the State; and

(5) the planning of unified systems that provide citizens of the State who do not currently wish to pursue bachelor or advanced degrees a clear and identifiable path to careers in technical areas with the purpose of achieving comfortable living standards.

(c) SUBMISSION OF APPLICATIONS.—Applications shall be submitted through the chief executive officer of the State.

(d) FEDERAL SHARE.—Federal funds provided under this section may not exceed 50 percent of the total cost of establishing a statewide technical education and training network.

(e) REPORT.—Not later than 3 years after the award of a grant under this section, the chief executive officer of a State shall submit a report to the Secretary of Education evaluating the achievements of, and difficulties in unifying on a statewide basis, Federal, State, and local programs and suggest ways in which the Federal Government could improve its programs in order to better meet the training needs of the citizens of the State.

(f) DEFINITION.—For the purposes of this section, the term "State" includes the District of Columbia, and the Commonwealth of Puerto Rico.

(g) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated $15,000,000 for fiscal year 1992 and such sums as may be necessary for each of the fiscal years 1993, 1994, 1995, and 1996 to carry out the purposes of this section.

SEC. 7. INDUSTRY WORKER TRAINING INFORMATION.

(a) GENERAL AUTHORITY.—The Secretary of Labor, in conjunction and consultation with the Small Business Administration and other relevant agencies, shall compile information and statistical data, at the Department of Labor or by contract, on the total annual expenditure of United States industry on formal worker training programs, quantity of training, and other relevant worker training information in the following areas—

(1) by firm size: for example, small, medium, and large companies;

(2) by and within sector: for example, service and manufacturing;

(3) by industry, such as—

(A) automobiles;

(B) financial;

(C) computer software and hardware;

(D) steel and other process and natural resource-based industries; and

(E) consumer electronics;

(4) by job classification, such as—

(A) marketing;

(B) sales;

(C) professionals;

(D) first-line supervisors;

(E) middle managers;

(F) executives;

(G) production workers; and

(H) officer workers;

(5) by purpose of training, such as—

(A) entry level;

(B) skills upgrading; and

(C) training for advancement; and

(6) any other data such as international comparative data that may be available and appropriate.

(b) REPORT TO CONGRESS.—The Secretary of Labor shall submit biennally a report to the Congress providing such information and statistical data in a useful format. The Secretary shall also make such information available to United States industry.

(c) AUTHORIZATION.—There are authorized to be appropriated sums as may be necessary for each of the fiscal years 1992 through 1996 to carry out this section.

SEC. 8. REPORT ON TOTAL QUALITY SCHOOLS.

(a) REPORT TO CONGRESS.—Not later than 180 days after the date of enactment of this Act, the Secretary of Education, in conjunction with the Secretary of Commerce, shall submit to the Congress a report on the feasibility of adopting principles of total quality management, as embodied by the Malcolm Baldrige National Quality

Award, to improve the quality and relevance of secondary and postsecondary education.

(b) CONTENT.—The report under subsection (a) shall include—

(1) a description of a model "total quality school", including a description of the roles of parents, students, teachers, administrators, government, the private sector, and any other relevant entities;

(2) possible positive and negative effects of a total quality-influenced curriculum on education and student learning, including an analysis of the costs and benefits of the adoption of total quality approaches to education;

(3) Federal, State, and local policy options and their barriers to implementation; and

(4) any specific recommendations of the Secretaries for congressional action.

O

Mr. VALENTINE. Are there any questions?

[No response.]

Mr. VALENTINE. If there are no questions, the bill is open for amendments.

I will offer an amendment which was designated the first amendment and a copy of which has been presented to the Members of the Committee. Let me say that this amendment deletes the portion of the bill designated as Section Four, which provides for an Industrial Quality Foundation.

I'll ask Jim Dietz to give further explanation of this, but let me say before I ask him to comment, that it was felt that this concept needed additional preparation and perhaps an additional hearing before we undertook to direct a mandate or suggest the creation of this Quality Foundation. We mean for it to be a matter of real substance. A concern arose as to whether or not if we kept this language in the bill, and then next year or sometime in the future we came forward with another effort at an Industrial Quality Foundation that some would say, "Well, you have already done that."

Would you add to or take from that description, Mr. Dietz?

Mr. DIETZ. Yes, Mr. Chairman. We felt that the American Quality Foundation, the ideas were fundamentally sound. It was simply a matter of taking further time to study the ways in which we should implement those ideas.

[The amendment offered by Mr. Valentine follows:]

Amendment to H.R. 3507
offered by Mr. Valentine

Beginning on page 13, line 3, strike Sec. 4. Renumber the following section.

Mr. VALENTINE. Are there any questions? Is there any Member who has anything they want to say about the amendment one way or the other, any discussion?

[No response.]

Mr. VALENTINE. I will put the question, then. All those in favor of the amendment let be known by saying aye.

[Chorus of ayes.]

Mr. VALENTINE. Opposed, no.

[No response.]

Mr. VALENTINE. The ayes have it.

Now, I will recognize Mr. Lewis for an amendment.

Mr. LEWIS. Thank you, Mr. Chairman. I do have an amendment to H.R. 3507. I have four amendments that are the same, but amend different sections of the bill. I ask unanimous that they be offered en bloc.

Mr. VALENTINE. Without objection, so ordered.

Mr. LEWIS. The amendments, Mr. Chairman, are the same as the first one offered in the earlier bill. The amendments simply require that the funds authorized for fiscal year 1992 come from already authorized funds. Therefore, this legislation does not provide new money, and does not add to any deficit problems.

The amendments also establish that the funding levels for the fiscal years 1993 through 1996 does not exceed the maximum level established for fiscal year 1992. I also understand, Mr. Chairman, that the staff of both the majority and minority have cleared these amendments. So I therefore urge the adoption.

[The amendments offered en bloc by Mr. Lewis follow:]

Amendment to H.R. 3507
offered by Mr. Lewis

On page 12, lines 23 through page 13 line 1, strike, "for fiscal year 1992 and such sums as may be necessery for each of the fiscal years 1993, 1994, 1995, and"

Insert in lieu thereof:

",from sums otherwise authorized to be appropriated, for each of the fiscal years 1992 through".

On page 22, lines 9 through 11, strike, "for fiscal year 1991 and such sums as may be necessary for each of the fiscal years 1993, 1994, 1995,"

and insert in lieu thereof:

",from sums otherwise authorized to be appropriated, for each of the fiscal years 1992 through"

On page 24, lines 20 through 22, strike, "for fiscal year 1992 and such sums as may be necessary for each of the fiscal years 1993, 1994, 1995, and"

and insert inlieu thereof:

",from sums otherwise authorized to be appropriated, for each of the fiscal years 1992 through"

On page 26, line 16, following "appropriated" insert the following:

",from sums otherwise authorized to be appropriated," Mr. VALENTINE. Let me say that as with any other amendments introduced by Mr. Lewis, we are in full agreement. I believe that they add significantly to the legislation. I believe that I know that they will enhance its opportunity or the chances of its passing.

Is there any further discussion?

[No response.]

Mr. VALENTINE. If not, the Chair will put the motion. Those in favor of the amendment will signify by saying aye.

[Chorus of ayes.]

Mr. VALENTINE. Opposed, no.

[No response.]

Mr. VALENTINE. The amendment is agreed to.

Are there any further amendments? If not, I will recognize Mr. Lewis for a motion.

Mr. LEWIS. Thank you, Mr. Chairman. I move that the Subcommittee report the bill, H.R. 3507, as amended and that the staff be instructed to prepare a legislative report and make the technical and conforming amendments and that the Chairman take all the necessary steps to bring the bill before the Committee for its due consideration.

Mr. VALENTINE. You have heard the motion. Is there any debate or discussion? If not, the Chair will put the question. All those in favor of the motion signify by saying aye.

[Chorus of ayes.]

Mr. VALENTINE. Opposed, no.

[No response.]

Mr. VALENTINE. The ayes have it. The motion is agreed to.

Is there any further business before the Subcommittee?

[No response.]

Mr. VALENTINE. If not, Mr. Roemer has indicated to the Chair that he would like to be listed as cosponsor of these two bills. Let me say if there any other Members of the Subcommittee who wold like to become cosponsors, if you will let some of the three members of the staff that you see here, Mr. Turner, Mr. Dietz, or Mr. Sigmon. Let them know and we will arrange to have that done.

Before I adjourn, let me thank the members of the subcommittee for attending this meeting. I think we have done good work here today. I want to express appreciation to the members of the staff who helped a little bit to get us this far.

[Laughter.]

Mr. VALENTINE. If there is no further business to come before this Subcommittee, we will stand adjourned.

[Whereupon, at 10:03 a.m., the Subcommittee adjourned, to reconvene at the call of the Chair.]

FULL COMMITTEE MARKUP OF H.R. 3507—AMERICAN INDUSTRIAL QUALITY AND TRAINING ACT OF 1991

FRIDAY, NOVEMBER 22, 1991

House of Representatives,
Committee on Science, Space, and Technology,
Washington, D.C.

The Committee met, pursuant to call, at 10:08 a.m., in Room 2318, Rayburn House Office Building, Hon. George E. Brown [Chairman of the Committee] presiding.

The **Chairman**. The meeting will come to order.

Without objection, permission is granted for coverage of this meeting by television, radio, and still photography.

I note the presence of a large number of very handsome young people in the audience. I wonder if Mr. Valentine would like to say anything about them.

Mr. **Valentine**. Yes, I would, Mr. Chairman.

The **Chairman**. The gentleman is recognized for that purpose.

Mr. **Valentine**. Thank you, Mr. Chairman. I would like to introduce to the Committee my personal "body guard". [Laughter.] Not really. It's a group of ROTC students from Northern Nash Senior High School in Nash County. I was scheduled to greet them at the front of the Capitol and have my picture taken with them so as to enhance my image and improve my situation. But the work of the Congress intervened and I wanted to have an opportunity to see them, so I invited them up and here they are. I hope they will be able to stay with us for a while and view the proceedings of the Committee.

[Applause.]

Mr. **Schiff**. Can I ask the gentleman to yield for just one moment?

Mr. **Valentine**. Yes, I yield.

Mr. **Schiff**. Thank you.

I just wanted to add very quickly that I have worn that same uniform for 23 years as an Air Force Reservist, specifically in the Air Guard, so I'm glad to see so many of you proudly wearing it, too.

Thank you. I yield back.

Mr. **Valentine**. I thank the gentleman.

Before they came into this room, I was able to form them up and have them get into a formation, being an old drill sergeant myself.

Thank you, Mr. Chairman, for your indulgence.

The **Chairman**. Thank you, Mr. Valentine. Of course, we welcome all of the visitors here this morning.

We are met this morning to take up two bills, H.R. 3507, the American Industrial Quality and Training Act of 1991, and H.R. 191, the Technology Transfer Improvements Act of 1991.

I would like first to make a few opening remarks, and then to recognize Mr. Walker for any remarks that he might have.

These bills have both been reported from the Subcommittee, chaired by Mr. Valentine, on Technology and Competitiveness. As I understand it, both have been reported out of the Subcommittee unanimously.

There has been some questions raised with regard to H.R. 3507. I want to make note of that fact. There are, of course, problems with any new program being developed and legislated by the Congress for very understandable reasons. There is a lack of funding for new programs within our budget, and even legislation which proposes to redirect existing funds without increasing them is subject to the necessity of justifying the priority of such programs in light of existing priorities that we have. Our distinguished Ranking Minority Member will raise these questions eloquently, I'm sure, and we can debate them.

I have had it proposed to me that this legislation is so controversial that we should avoid taking it up. Of course, I'm allergic to controversy, as most people are, and felt we should make every effort to resolve any problems with this as I would with any legislation. I suggested to Mr. Valentine that he make every effort to see if there was a possibility of resolving these questions. However, I think they are sufficiently fundamental that you cannot, by the nature of it, resolve all the questions. They revolve around a basic sense of priority.

Now, I have read both of these bills. I think they make a valuable contribution to the legislative framework with regard to advanced technology and training of workers for advanced technology positions, and they need to be debated and acted upon in accordance with the wisdom of this committee as to whether they should be taken to the floor.

Although I delayed scheduling a markup on it as long as possible, this is about as late as we can proceed to have a markup. I was torn here with the question of whether I should bring up the bill which is least controversial and leave the other, and I felt that it would be difficult for me to justify bringing up one of the bills without bringing up the other. As a consequence, they are both before us.

I have to relate this personal background, also. When I came to Congress in the 88th Congress, I was assigned to the Committee on Education and Labor. In that connection, I had the opportunity to serve with one of the great men on that committee, Carl Perkins, and to work with him in developing the Elementary and Secondary Education Act of 1964 and other pieces of educational legislation. We had a President then, John Kennedy, who wanted to be an educational President and was supportive of a larger Federal role. In a sense, George Bush, who also aspires to be an educational President, is following in those footsteps, or in the words of Newton, he's "standing on the shoulders of giants" in an effort to recognize the importance of education and to do something about it in this country.

The legislation that I was instrumental in working on at that time was vocational education—in a sense, very parallel to what we have here. The body of legislation that we have in that field, largely under the leadership of Carl Perkins, is still looked to as an important ingredient in our total national educational structure.

I mention this only because we're fortunate in having on this committee the son of Carl Perkins, Carl Perkins, Jr., and we continue to have a strong interest in vocational education and in the sort of things that are reflected in this bill that Mr. Valentine has offered. I have a sentimental attachment to it, I'll tell you that very frankly.

I recognize the problems that face us with the budget and I have no ready solution for it. Even if I had, it wouldn't be accepted, so it's legitimate to continue discussing these matters and see what we can come up with. But I make this statement so that all the Members will understand the constraints that I've been under and how I have approached these. I will try not being any more devious than I need to be.

I will recognize Mr. Walker at this point.

Mr. WALKER. Thank you, Mr. Chairman.

We're here to consider two bills in the name of competitiveness. One is a consensus proposal requested by the Administration to entice more Federal technology transfer by allowing the private sector participants in Government R&D to benefit from copyrights on computer software for commercial purposes. The other is a new, half-billion dollar grant program for remedial education and worker training, opposed by the Administration due to the serious policy questions it raises, it's duplication of existing programs, and because it's a budget buster.

Unfortunately, these two bills have been unfairly and, in my opinion, irresponsibly linked. Besides being presented as competitiveness bills, they couldn't be more different. One was proposed by the Administration and the other is opposed by the Administration. One promotes private sector initiative; the other one calls for more and bigger Government subsidies. One costs nothing, and the other spends money we don't have. One is unanimously endorsed and the other raises many concerns. One enhances current policy, the other could do harm to existing programs. Finally, one deals with intellectual property and the other seemingly unrelated labor skills. Unfortunately, we're told we have to mark up both or neither right now, whether ready or not. That is troubling, both in terms of policy and process.

The bill that causes us so much concern is, of course, the one that we must consider first today. That is not to say its goals and intent aren't laudable. Improving the quality of the U.S. work force is something that I and I'm sure every other Member of the Committee supports. In fact, we've been offering in good faith the work on significant new policy and budget implications that this legislation raises over the recess in an effort to get a consensus measure that we can move first thing next session.

But the markup now is premature, for a multitude of reasons that I will be compelled to raise in a few minutes. After all, the

Subcommittee action occurred just a few weeks back, in the press of other business at the end of the session, such as NASA, NOAA, the high-performance computing bill on the floor, in conference. Doing all those kinds of things has made devoting appropriate time and attention to this legislation impossible.

I must note that we on the minority side were given the clear impression—and I want to emphasize this—we were given not only the clear impression but the absolute distinct impression that there would be a more sufficient time to discuss and work on the outstanding issues, since this bill would not go to the full Committee this year. In fact, we were told in the Subcommittee process that this bill would not go to the full Committee this year.

Based on that understanding, the bill was not substantively challenged in the Subcommittee. Now I know better. In the future, we will make certain that if there are questions about these bills to Subcommittee, they are going to be fought and fought vigorously. I no longer have any faith in a process that does not give us accurate information.

Frustratingly, there is no necessity to rush this through. It is referred to two other committees, Education and Labor and Energy and Commerce, neither of which has any plans for action until the next session. Additionally, we have other worker training and technical education bills in this committee not yet ready for committee action. Since they are on the same subject, shouldn't we consider them all together so as to produce the most rational, balanced, coordinated policy possible?

This piecemeal approach seems like a recipe for disaster. In this particular case, if we're determined to do things that undermine the core program at an agency such as NIST, then we should at least do so in a rational basis. Let's not do it irrationally, like we're intending to do here today.

So as I mentioned a moment ago, given the situation, I feel there is no choice but to raise the many problems with this legislation through individual amendments. I wish this wasn't necessary. There obviously are more productive and agreeable alternatives available to accomplish the purpose here. As I have suggested, we could do that. We could do it with negotiations that I think would produce a good bill. But, failing that, we're going to have to bring up the problems and see where we go.

The establishment of a grant technology program in the Technology Administration of the Department of Commerce to retrain recipient's employees is a basic significant policy change to the Technology Administration's mission of supporting industrial R&D. This program, if justified, seems much more appropriate in the Labor Department. It could seriously damage the focus of the Commerce technology development effort and I think would be a serious mistake, particularly to proceed forward as we are here today.

Now, I might say, Mr. Chairman, I made a count here a minute ago, and you had better get some more people in the room, because we don't have a sufficient number here to do business at the present time.

The **Chairman**. I thank Mr. Walker for his usual eloquent expression of his views. [Laughter.] I can assure him that his rights will be fully protected, and if at any point we try to transact business in the absence of a quorum, it will be quite appropriate for him to raise that issue.

The staff assures me that we have a quorum.

Mr. **Walker**. For the moment. When I started my remarks, we didn't. We have 18 now, just enough.

The **Chairman**. The Chair, in an effort to allow Mr. Walker full and free opportunity to present his amendments, would like to avoid any further opening statements, except the statements by the Chairman of the Subcommittee and the Ranking Minority Member, which they will be recognized for at this time. This is on the substance of the report.

Mr. Valentine.

Mr. **Valentine**. Thank you, Mr. Chairman.

Mr. Chairman, I am pleased to present to the full Committee H.R. 3507, the American Industrial Quality and Training Act of 1991. This bill aims to enhance American competitiveness and the quality of American products by addressing the work force training needs of our Nation.

The bill contains five programmatic sections. Section three describes the American work force quality partnerships. This is a competitive grants program, administered by the Technology Administration of the Department of Commerce, to establish partnerships between one or more manufacturing or technology-based firms and one or more institutions of higher education. In order to qualify, industry must be committed to adopting a competitiveness-oriented strategy, such as total quality management. Colleges gain enhanced ability to train other nonpartnership-affiliated citizens and enhanced technology education infrastructure and capacity. Workers get training in new work organization strategy, in total quality techniques, in technical and technician skills, or basic literacy instruction.

Section four, Mr. Chairman, and Members of the Committee, describes the youth technical apprenticeship program. This competitive grants program, administered by the Department of Labor, provides training and employment in manufacturing or technology-based firms. The grants are awarded to nonprofit organizations representing labor, industry, education, or consortia of such organizations. The program begins in the junior high or high school and ends with a degree or certificate from a community college. There is a provision to allow students to continue on to four-year institutions. A national clearinghouse on youth apprenticeship programs in the United States is established for the use of individuals or organizations that wish to learn more about or establish youth apprenticeship programs.

Section five establishes a statewide technical education and training network program. This program encourages States to unify their technical education and work force training programs in coherent statewide systems. Grants are awarded for the purpose of planning these strategies. States may examine Federal, State and local programs to identify training needs that currently go unmet or populations which are currently underserved. States are asked to suggest ways to improve Federal programs of this type. This also is a competitive grants program and is administered by the Department of Education. Matching funds are required.

Section six, the industry worker training information program directs the Department of Labor to gather comprehensive statistics such as costs and quantity on employment-based training. Statistics are also to be gathered on to whom this training is offered. The Department is to report to Congress biannually.

Finally, Mr. Chairman, and Members of the Committee, section seven, the report on total quality schools, directs the Departments of Education and Commerce to work together in exploring the feasibility of applying the techniques of total quality management. The Departments are to prepare a report that discusses relative benefits, costs and obstacles, and recommends Federal policy options.

Some have asked why it is necessary for H.R. 3507 to authorize programs in three departments. It is necessary because the elements of competitiveness are embodied in these three departments of Government: in Commerce, in the Department of Labor, and in the Department of Education. Those governmental organizations were formed in past days, when programs could be strictly separated between these functions. Today this is not the case. Today we must begin to look at these functions together. Clearly, it is in the direct legislative mandate for the Department of Commerce's Technology Administration to provide for the long-term competitiveness of the economy through work force training programs, as well as their own programs.

Mr. Chairman, H.R. 3507 is a bill for our Nation's future. Competitiveness goes beyond the Malcolm Baldrige Award. The Baldridge Award is a great concept, but those who think the Baldrige Award is enough to ensure the future of our grandchildren are misinformed. Education and the training to do and to think for one's self are the keys to our future.

Mr. Chairman, again I say to you and the Committee that I'm pleased to have the opportunity to present H.R. 3507 to the committee for its consideration, and I urge my colleagues to support the legislation.

I say finally to the Members, and specifically to Mr. Walker, who has expressed some displeasure, with vehemence, to this legislation, that the bill was discussed and studied in great detail by our subcommittee. It was adopted by the Subcommittee without a single dissenting vote. In our opinion, in addition to what we believed to be a very modest cost—which is not an addition to the budget—we simply direct that a certain amount of money be spent for this purpose, not additionally, but from funds already authorized and already appropriated. So it is certainly no budget buster. People might disagree with the concept, but to say that it busts the budget is unfair to us.

Finally, Mr. Chairman, and Members of the Committee, this is an innovation. As far as we know, no program sponsored by the Federal Government and the taxpayers of this Union, to do the things that we hope to do here, currently exists. Every report almost that addresses the problem of American competitiveness points to failures in the educational system, failures in the preparation and planning for those people in high school who are not going on to college, to fill the skilled positions that are going to be necessary to American industry in the future if we are to reverse the present trend.

I suggest, Mr. Chairman, in addition to what this legislation will accomplish that is of a tangible nature, that we can say the taxpayers of this country helped to pay for, it should be an example. We believe it will be an example to business and industry and to educational institutions in all the 50 States to emulate this program and to build upon it.

Thank you, Mr. Chairman.

The **Chairman**. The Chair recognizes the distinguished Ranking Minority Member of the Subcommittee, Mr. Lewis of Florida, for any statement he wishes to make.

Mr. **Lewis**. Thank you, Mr. Chairman.

Mr. Chairman, this markup is the second of many steps that will be required before this legislation passes the House. I congratulate Chairman Valentine for introducing H.R. 3507, the American Industrial Quality and Training Act of 1991. H.R. 3507 has a goal: the enhancement of technical training in the United States. If the United States is to remain competitive worldwide, in the face of dramatic global, political, and economic changes, we must have an adequately trained work force. However, to accomplish this goal is, in my opinion, the focus of this markup.

I do not know if this legislation before us is the best avenue to address this problem. However, as H.R. 3507 moves forward through this committee and others that have jurisdiction, I think it may have changes at each step to eliminate problems that Members have.

In the Subcommittee I offered amendments to reduce the funding level of existing authorized levels. These amendments were adopted and no new money is proposed in this bill. Today we can incorporate the changes offered by Members that will improve the legislation so that the Committee will pass this legislation.

Now, Mr. Chairman, after hearing the Ranking Member's comments, to some degree I feel almost, as Ranking Member of the Subcommittee, as remiss in my responsibilities. I don't feel that way. I feel that if the Administration had problems with this bill, it should have come forward at the Subcommittee level. It did not.

For those Members that had objections to this bill, I worked with the Chairman to incorporate amendments in order to correct the bill, and we thought we did. It was yesterday that I found out there was severe opposition to this bill. I regret that that happened. I find myself today between the proverbial "rock and a hard place". I feel a loyalty to my Chairman and a loyalty to my Ranking Member, and I'm going to be split on both of them.

I am not going to vote for all of Mr. Walker's amendments. I will probably vote for some of them. But I will say this, that if any Member of this Committee has a problem with a bill, I think it's incumbent upon you to take it up at the Subcommittee level, not wait until it gets to the full committee. If the administration has a problem with this bill, it should come to the Subcommittee. That's what we have subcommittees for, or we should get rid of them and do everything at the full Committee.

But I find myself placed in a very uncomfortable position that I don't appreciate, where I have to be in opposition to Mr. Walker and also in opposition to Mr. Valentine.

Mr. **Walker**. Would you yield for just a moment on that point?

Mr. **Lewis**. No, sir, not until I'm finished.

I feel, ladies and gentleman, that we have a responsibility to allow committees to work their wills. We have not done that. I feel that there are bills that are going to come before this committee that yes, will be railroaded through, and others that will come as they are now. I feel that as we move forward on this bill and it goes through the other two committees, that maybe, just maybe it can be perfected. But that's the problem and that's also a compliment to the Committee system.

So, Mr. Chairman, I just had to make those comments. I will yield to my Ranking Member.

Mr. **Walker**. I thank the gentleman for yielding.

I just want to make the point that I think the Undersecretary of Commerce for Technology, Mr. White, did testify before your subcommittee with regard to one of the sections of the bill, about the place where you're putting the training programs. You did have testimony from the Administration before your Subcommittee indicating that they were opposed to things that are ultimately in the bill. That's my concern, that those things weren't taken into account. That's one of the problems we're going to have here today.

Mr. **Lewis**. That may be true, what you say, but it's my understanding that that testimony was submitted in writing and not in testimony before the committee.

Mr. **Walker**. Nevertheless, the Administration did come to your subcommittee before you marked up this bill and made it clear there were parts of this bill that you were proceeding on that were a problem. That's what we had hoped to work out, and rushing to judgment here today has prevented us from working it out. That's my concern.

Mr. **Lewis**. Well, the gentleman from Pennsylvania may be correct. I did not see that testimony, nor did I read it, but that doesn't necessarily always mean the Administration is correct.

Thank you, Mr. Chairman. I yield back.

The **Chairman**. The Chair appreciates the statement of the gentleman. I would like to point out, as Mr. Walker has already mentioned, that action by this committee is only the first step in what may be a fairly lengthy process. It may well be the other committees to which this is referred will raise the same objections with regard to the appropriateness of locating some of these functions and will suggest changes.

I have difficulty in feeling that it's a matter of whether we act now or act in January or February is going to be crucial to the future of this legislation. We do have to have the input of the other committees as well before any final action is taken.

At this point the Chair would like to proceed with the amendments and would like to recognize Mr. Walker. Before we do that, it's necessary that we have a motion to adopt the report of the Subcommittee. Mr. Lewis, do you wish to make that motion?

Mr. **Lewis**. Mr. Chairman, I move the adoption of the recommendation of the Subcommittee on Technology and Competitiveness on

H.R. 3507, the American Industrial Quality and Training Act of 1991.

The **Chairman**. Without objection, the motion is agreed to. Now the Chair recognizes Mr. Walker for his first amendment.

Mr. **Walker**. Mr. Chairman, if our intention is to move the bill—and it obviously is—what I would hope to do maybe is get to some of the really core issues that are involved here, rather than going through the list as was prepared. We were told this was the way I had to do the list. This is not the order in which I would prefer to offer the amendments. I think we can limit the number of amendments substantially if I'm permitted to offer the amendments in the order that I would like to, to deal with the core issues involved, and then I think we can deal with far fewer amendments here today and move the Committee along.

Will that be possible to do?

The **Chairman**. The Chair would like to respond by telling the gentleman that anything the Committee wishes to do is possible. In this case, the gentleman would have to require unanimous consent and there may be some who object to it. But let me explain the rationale for the order that we have.

Your amendment, which strikes the finding section and replaces it with the requirement for a feasibility report is actually a substitute for the whole bill, because, in effect, it removes those operative provisions of the bill and substitutes a report.

The Committee amendment roster follows immediately following the markup proceedings.

It is our feeling that all of the crucial issues that you have brought up are appropriate to bring up in connection with this amendment and we will act expeditiously to debate and to act on it.

The second amendment, 1A, by Mr. Valentine, is, in an effort to accommodate you, is almost a substitute for the bill, in that it offers en bloc the largest majority of the amendments that you have, plus some additional material, and accepts them, trying to resolve then only what remains for the subject of further debate.

Now, it is my view that this does allow for an expeditious and full consideration of the points that you raise, and I know you would never want to suggest a procedure which would merely act to delay the Committee beyond the point at which we have a quorum.

Mr. **Walker**. Mr. Chairman, that is not my intention here. I have seen some of your staff indicating that is my intention. To some extent I resent that as well. That is not my intention. My intention was to get at a number of things, and I was perfectly prepared to offer a number of these things en bloc.

We have not seen this technical and conforming amendment. If would be helpful if the minority had been given a copy—

Mr. **Valentine**. Mr. Chairman.

Mr. **Walker**. —so that we would know which of these amendments you're accepting. At that point, that would certainly be a help. But we haven't seen that yet.

The **Chairman**. The gentleman will be accommodated, I assure you.

May I reassure him that I did not impugn his motives in any way. In fact, I said I did not accept that explanation and I will discourage the staff—

Mr. **Walker**. I thank the Chairman. But it would be helpful, again—I mean, can someone read off to me the numbers of the amendments that are included in the technical and conforming amendment?

Mr. **Valentine**. Mr. Chairman.

The **Chairman**. Would the gentleman care to respond?

Mr. **Valentine**. Mr. Chairman, the amendment which I intend to offer, designated 1A, is at the desk. I would ask the Chair if you would have the staff distribute it and we can see it.

Let me say to the gentleman that I believe the order that the Chair has suggested as a way to proceed is the only logical way, because the first amendment, if adopted, changes the nature and I would say eviscerates the legislation. We might as well face that at the beginning.

Mr. **Walker**. Well, I would ask unanimous consent that—

Mr. **Valentine**. I would say, also, that—

Mr. **Walker**. I would ask unanimous consent that that amendment be withdrawn.

The **Chairman**. Okay, without objection.

Mr. **Valentine**. Well—What is the motion?

Mr. **Volkmer**. Get rid of it.

Mr. **Valentine**. I think I've got the floor. Let me say simply that my amendment adopts 20 of Mr. Walker's amendments. We agree to them, 20 of them. [The 20 amendments are numbered 2, 3, 4, 5, 6, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, and 25 in the amendment roster following the markup procedings.]

The **Chairman**. The gentleman has made his point.

There was a recent article in the press in which the Chair, that's me, was cited as being unpredictable. I should make it clear that Mr. Walker is also entitled to that accolade.

[Laughter.]

Does the gentleman wish to renew his request?

Mr. **Walker**. Mr. Chairman, just to clarify, this is the first time we have seen this amendment. You know, if we're going to get some kind of way of dealing here, it would be helpful to the minority to at least be a part of seeing the things which are sent to the desk. As I say, this is the first time we've seen it. If you can give me a few minutes here to go down through here and figure out what's in the gentleman's amendment.

I would renew my unanimous consent request, that my first amendment on a study be withdrawn.

Mr. **Henry**. Mr. Chairman?

Mr. **Ritter**. Mr. Chairman?

The **Chairman**. One moment. The Chair needs to proceed in an orderly manner. We have a unanimous consent request.

Mr. **Henry**. Mr. Chairman, reserving the right to object—

The **Chairman**. The gentleman reserves the right to object. That's the proper way to proceed. The gentleman is recognized under his reservation.

Mr. **Henry**. Thank you, Mr. Chairman. It was not my intention to object, but you had requested that we refrain from opening statements but I think, given the nature in which this debate is proceeding, I would like to speak to the overall merits of the legislation.

Mr. **Ritter**. Will the gentleman yield?

Mr. **Henry**. I would be pleased to yield.

Mr. **Ritter**. As someone who was seeking a similar kind of recognition earlier, I want to support his comment. I think it's absolutely essential that, for the Members here, some context for this debate over 27 amendments be established. We have not discussed the merits and the demerits of this bill. We have not discussed the context with the education and industrial climate out there. I really think that would be very helpful before we get into the nuts and bolts.

I yield back to the gentleman.

The **Chairman**. Would the gentleman yield to me briefly, since he has the reservation?

Mr. **Henry**. I would be pleased to.

The **Chairman**. The Chair would like to state that his only interest is in promoting an orderly process here. He had previously told Mr. Ritter that he would be recognized to express his concerns in connection with Mr. Walker's first amendment, which is a broad amendment. If he withdraws it, then Mr. Valentine's equally broad amendment will be before us and the Chair will be pleased to recognize anyone to discuss and present their points of view in connection with the overall bill. It's very appropriate to do so in connection with these amendments.

Mr. **Ritter**. Okay. If the gentleman from Michigan would yield for another moment, I think that's not unreasonable. But before the debate on mechanics and details gets out of hand, I think there needs to be some overview presented. I thank the gentleman.

The **Chairman**. The Chair recognizes the contribution that the gentleman can make and will be pleased to recognize him.

Do you wish to, under Mr. Henry's reservation, request to speak, Mr. Rohrabacher?

Mr. **Rohrabacher** Yes, just for one moment.

I would just like to say that Chairman Valentine has always been very open to any changes and any type of dialogue that we needed in subcommittee. I think Chairman Valentine has gone the extra mile every time we've had a concern. Frankly, I'm sorry that this sort of conflict we see emerging now didn't happen in subcommittee because I know that Chairman Valentine would have taken care of it. I'm just sorry that we face this confrontation right now.

The **Chairman**. Does the gentleman wish to withdraw his reservation?

Mr. **Henry**. Not at this moment, Mr. Chairman. I would like to speak to my reservation. I will not object, but I'm reserving—

The **Chairman**. Would the gentleman try to speak succinctly to his—

Mr. **Henry**. Yes. I am trying to, Mr. Chairman. I'm trying to expedite consideration and some understanding on all Members of the Committee.

In the Subcommittee the substantive issues that are before us by way of the Walker amendments were not presented to us at that time. In all deference to Mr. Walker, also Mr. Valentine's amendment, which adopts many of the Walker amendments, is new to us. So were his own amendments, which were not presented until about 3:00 o'clock. Most of us have not seen the Walker amendments, either. So let's put this in its—and it's very obvious that Mr. Valentine is trying to incorporate a good many of Mr. Walker's concerns. But to object to the fact that Mr. Valentine's amendments have not been viewed by us, neither have his own. That's the first point.

Secondly, I am concerned because I think there's broad consensus and I feel very similar to Mr. Lewis. I think there's a need for this legislation. I know there is a very strong philosophical objection to the legislation on behalf of my Ranking Member. I want to respect that fact and I want to acknowledge it. But I have to say that we went into this as a subcommittee. We are very well aware of the fact that this initiative goes beyond—I would say well aware of the fact that it goes beyond some of the proposals and initiatives of the Administration. I do not believe it is contrary to the direction of the Administration.

Thirdly, I want to stress the importance of this. This gets to the base of industrial competitiveness and technology, to the base, to the root. It is primarily important. I understand my Ranking Member's frustration apparently that he was under some understanding that the bill would not be taken up in the waning hours of the session. I did not realize that. I don't know if, in fact, that is the case. Certainly he believes it to be and I have no reason to question his veracity.

I would raise that question on behalf of the gentleman from Pennsylvania to the full Chair, as to whether or not it is, indeed, necessary to continue today if, in fact, that understanding was there. If there's a reason for pursuing today, I would appreciate the Chairman's reason for doing so because normally we're able to accommodate many of these concerns. But I want to also make very clear, both to the Chairman and my Subcommittee Chairman, and my Ranking Member, that many of us on our side believe this bill is critically important.

In the Defense Department authorization bill we established a new program in manufacturing engineering research. I mean, I was shocked to discover there are only seven schools in America, seven in all of America, that offer Ph.D. programs in manufacturing engineering. Seven.

I believe I have heard the gentleman from Pennsylvania in conversations talk about why is it we can't get strong apprenticeship programs in this country like Germany has, some of the European countries. This is, in part, an attempt to build those kinds of ties between manufacturing in the workplace and academia.

As a Member of the Education and Labor Committee, I also want to remind my Ranking Member from Pennsylvania that in recent revisions to the voc education program and to the JTPA program, these are the same kinds of ties and bridges that we're trying to make. This complements, rather than undermines, other initiatives of the Administration in the last two or three years.

Mr. **Walker**. Would the gentleman yield?

Mr. **Henry**. I'm going to withdraw my reservation, but I can't understand why we're in this impasse at this point.

Mr. WALKER. Would the gentleman yield?

Mr. HENRY. I would be pleased to yield.

And I think we will need some explanation here, too, between the gentleman from North Carolina and Mr. Walker, because we're going to be here all day, perhaps over nothing, but perhaps many of your concerns that my colleague has addressed.

I would be glad to yield to my ranking member.

Mr. WALKER. I thank the gentleman for yielding.

Let me just say to the gentleman that we were assured at the staff level along the way that this was not going to come up this year. That's the basis on which I proceeded. There are some fundamental questions here. I don't know that I'm opposed to the direction that they're trying to go, the overall direction.

But let me say to you what you're doing—and maybe the Committee discussed this and you decided to do it this way. If you did, then I'm disappointed in the Subcommittee. You have decided to rob the core programs at NIST in order to do this program. Fundamental to what we are doing as a committee is that the core science programs at NIST remain intact. You have decided in this bill to rob those core programs in a fundamental agency in order to do this program. I think that's terribly wrong. I think it would be a good thing, if we're going to proceed in this direction, to at least not do it at the expense of the fundamental core science that's out there. In all honesty, that is the fundamental objection I have here.

Mr. HENRY. To reclaim my time—

Mr. WALKER. There are two or three other things that I think are problems here, but my core problem here is that you made a specific decision to rob NIST in order to pay for this brand new initiative.

Mr. HENRY. Mr. Chairman, I simply would say I disagree. We're getting to the merits. I'm trying to facilitate some way of working this out. But I do withdraw my reservation. Thank you.

Mr. VOLKMER. Mr. Chairman.

The CHAIRMAN. The gentleman has been very ingenious in using his reservation to object to conduct a major presentation.

Who seeks recognition?

Mr. VOLKMER. Mr. Chairman. Reserving the right to object—and I won't take long. But because of other commitments, I'm going to have to leave in a few minutes and I wouldn't have an opportunity to say anything.

Therefore, I want to let the Committee know that I stand strongly behind the gentleman from North Carolina and his legislation. I believe this legislation is necessary if we are to compete in the future with the other developed nations and even some of the developing nations.

I think we're going to be here all day today. They tell us we're going to be here until 7:00 o'clock tonight in session. So I don't see any reason why this legislation cannot be completed in this committee today.

I have had an opportunity—I got here a little early—to review some of Mr. Walker's amendments. I believe that some of those amendments should be strenuously opposed by this committee. If I'm not here, I am sure the gentleman from North Carolina will vote my proxy in opposition to those amendments because they are basically gutting amendments to this legislation. I think if we fail to pass this legislation eventually through the Congress, we're really putting our heads in the sand. We're saying we're going to be able to compete by just doing the things we've been doing, the way we've been doing them, and we don't have to advance in our education and training and develop new technologies.

Mr. Chairman, I will get off my soap box. I will withdraw my reservation. But I just wanted to let the Committee know that I think we should stand strongly behind the gentleman from North Carolina.

The Chairman. The business before the Committee is a unanimous consent request from the Ranking Member, Mr. Walker, to withdraw amendment number one. Is there objection? Hearing none, the request is granted and the Chair recognizes Mr. Valentine to present Amendment 1A.

Mr. Valentine. Mr. Chairman, Amendment No. 1A, I believe, has been placed by Members of the staff on the desk of each Member. The purpose of this amendment, Mr. Chairman and my colleagues, is simple. It incorporates the text of the bill as reported from the Subcommittee, as well as 20 of Mr. Walker's amendments as listed on the amendment roster. My amendment, I repeat, incorporates the bill as approved by the Subcommittee and accepts and includes therein Mr. Walker's amendments as listed on the schedule before the Members 2, 3, 4, 5, 6, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, and 25.

Let me say, Mr. Chairman, before I relinquish my time for an explanation, I would call on mainly the staff of Mr. Walker because these are his amendments. That's the only changes we make.

I appreciate very much the dilemma that some Members of the Committee, especially Members from the other party, find themselves in. Some have suggested they are here divided between maybe a loyalty to this Member as Chairman of the Subcommittee and to the Ranking Member, who is of their party. I appreciate and understand that situation.

As our colleague, Mr. Lewis, said, there is really no reason to have subcommittees unless Members who have problems with legislation will come to the Subcommittee and tell us about it and give us an opportunity to work it out. I don't think that basic science policy in this country is a partisan matter. I have tried to demonstrate that, as my friend from California said. We are here today before you with two pieces of legislation, one sponsored by the Chairman, who's a Democrat, and the other sponsored by Mrs. Morella, who is a Republican. We did not suggest to Mrs. Morella that there was anything tainted about her legislation because she is from the other party. We undertook to associate our colleague, Mr. Thornton, with that legislation so as to help to ensure its passage both through the Subcommittee and through this Committee.

Mr. Scheuer. Will my friend yield?

Mr. Valentine. I yield.

Mr. Scheuer. Is it true that this legislation was reported out unanimously by the Subcommittee?

Mr. Valentine. Unanimously, without a single suggestion or whisper from Mr. Walker or anybody else about these objections.

Mr. **Walker**. Well, if the gentleman would yield, I am told by Members of the Committee that they had absolutely no idea when it came out of committee that you were taking the money out of the core program at NIST.

Mr. **Valentine**. We are not taking the money out of the core program at NIST. I will agree to that part of your amendment, or anybody else's, which wants to guarantee that in writing.

Mr. **Walker**. Well, do you want to add—

Mr. **Valentine**. NIST is one of our principal, prime projects in our committee. That's one of our pets. We don't want to do anything to bother NIST.

Mr. **Walker**. You didn't include amendment 27, which does precisely that, in your package.

Mr. **Valentine**. The half of your amendment which protects NIST I hereby accept, and we would have accepted it in the Subcommittee had you come to us. We would have addressed the other problems that you are here trying to delay us or whatever. We would have addressed these problems. We might not have accepted them, but with Mr. Lewis, your representative, your Ranking Member and the other members of the subcommittee, we would have done what the Subcommittee is supposed to do; that is, address the problems you brought here.

As to this business about when we bring it up before the committee, I didn't make any commitment to you as to when this bill would be presented to the Committee for consideration.

Mr. **Walker**. You didn't make any commitment to me. We did receive—

Mr. **Valentine**. Who made a commitment to you?

Mr. **Walker**. At the staff level we had had—

Mr. **Valentine**. At the staff level.

Mr. **Walker**. That's right.

Mr. **Henry**. Will my chairman yield?

Mr. **Valentine**. Some staff person?

Mr. **Walker**. Well, I think the gentleman. Let's get back here and try to work this out, if the gentleman would yield.

Mr. **Volkmer**. Will the gentleman yield just for a minute?

Mr. **Valentine**. I yield, yes.

Mr. **Volkmer**. I would like for the gentleman from North Carolina, because I didn't get them down, to again slowly give me the numbers of the Walker amendments—

Mr. **Valentine**. Two, 3—

Mr. **Henry**. It's been distributed.

Mr. **Valentine**. —4, 5—

Mr. **Volkmer**. Okay. I've got it. I've got it now. Thank you.

Mr. **Walker**. If the gentleman would yield further, do I understand that the gentleman is prepared to take amendment 27, except for the date change, as a part of his own—

Mr. **Valentine**. I don't know what number it is. I'm prepared to take the portion of the amendment which says that none of this money shall come out of anything that NIST is doing.

The **Chairman**. That's amendment number 27, Mr. Valentine.

Mr. **Valentine**. I will accept the appropriate part of it.

The **Chairman**. The Chair would like to have an orderly process here. Mr. Valentine has been recognized to present his amendment. As soon as he completes his statement, then other Members will be recognized in order to discuss the amendment. The Chair has already promised to recognize Mr. Ritter first, if there are no objections. Even if there are objections, he is prepared.

Mr. Valentine, have you completed your presentation?

Mr. **Valentine**. Yes, I have, and yield back the balance of my time.

The **Chairman**. The Chair recognizes Mr. Ritter.

Mr. **Ritter**. Thanks, Mr. Chairman.

First I want to commend the Subcommittee Chairman and the Ranking Member for diligently pursuing a very important subject. I want to apologize for some of the rest of us Members on this side, perhaps for not as diligently in that subcommittee phase—and I think the Ranking Republican who spoke on the need to address these issues in Subcommittee is absolutely correct. But we all know about the pressures in this place and sometimes it doesn't happen.

Now, I think that the bill has the best of intentions. It is an excellent set of ideas to go forward to bring quality education to all America. I would say to the Chairman and the Ranking Republican that there is a great deal going on in the field. There is a tremendous amount of partnering right now between companies and schools.

I guess I have to ask the question: should we be establishing the kind of bureaucratic Federal grant and grantsmanship that incurs programs to overlay on top of that which is really bubbling up brilliantly across the length and breadth of this country? I mean, I just want to raise that question for the Members to consider.

In terms of this technical apprenticeship program, I am not sure that the language pays sufficient attention to what is going on in our vocational technical schools today, pays sufficient attention to those vocational technical schools, and perhaps it sets up a situation of competition with vocational education instead of support. What we need is greater support for the practical side of our secondary educational system.

I have been talking with experts in the field of vocational technical education—unfortunately post-subcommittee, and I didn't realize this bill was coming up so fast—but they say this could conceivably have a negative impact on voc ed in this country. It doesn't take into account sufficiently that which is being achieved and being worked on by voc ed. It sets up potentially a competitive system.

You know, I think an education award on quality—I think the bill doesn't take into account so much out there that is already dealing with an education quality award, and in the Department of Commerce they're working on an education quality award. The SCANS program, the Secretary of Labor's Commission on Achieving Necessary Skills, has a whole host of recommendations for core competencies in Total Quality Management and how to get that into the educational process.

My view is that the gentleman from North Carolina is doing a great service, that this is a very important bill. Its importance is now being recognized generically throughout this committee, I think probably by most Members today for the first time, and I just wonder if instead of taking what may be a less than leading product and bringing it to Education and Labor and Energy and Commerce, on which I also serve—and the gentleman from Michigan serves on Ed and Labor—is it possible to somehow fix this thing in a way that our product is the lead product and that we're not seeking damage control and repairs in somebody else's committee?

Other than that, I think the compromise worked out between the gentleman from North Carolina and the gentleman from Pennsylvania is appropriate, and I would even have an amendment to that. But I almost think that if we had a little more time, we could do a lot better job, since it is now on everybody's radar screen.

I yield back to the Chairman.

The **Chairman**. The time of the gentleman has expired, and the Chair recognizes Mr. Walker to speak on the Valentine amendment.

Mr. **Walker**. I thank the gentleman.

First of all, I appreciate Mr. Valentine coming forward with this amendment. It appears as though the Committee does agree that there were a number of fixes that needed to be done to their bill, and by agreeing to a whole series of the amendments that I have proposed, it seems to me they have provided a lot of those fixes and that is certainly a major step in the right direction.

It is particularly, I think, appropriate and gratifying that in our dialogue here a few minutes ago that amendment number 27 that I was to offer, regarding the core funding at NIST, is going to be accepted. That was my fundamental concern with the bill as it came forward. This was an attempt to make another raid on those accounts and I thought it was irresponsible to do so. The correcting language will assure that that is not done and, therefore, I think improves the bill substantially to provide the assurance that, whatever this program costs, it is not going to come out of the core science and research programs at that very vital agency. So that is a major help.

I want to thank Mr. Valentine for his amendment and for the inclusion of the NIST language. I am very pleased to support the gentleman's amendment.

Mr. **Traficant**. Mr. Chairman.

The **Chairman**. The Chair will recognize the gentleman next. But let me just say with regard to the schedule that the Chair would very much like to dispose of all the amendments on this bill and bring it to a vote so that we can bring up Mrs. Morella's bill and get out of here by 12:00 o'clock.

Mr. **Walker**. Mr. Chairman, just a point. I am prepared, with a couple of explanations, to withdraw all the rest of my amendments.

The **Chairman**. The Chair appreciates that very much. I will now recognize Mr. Traficant.

Mr. **Traficant**. Mr. Chairman, I am for Chairman Valentine's amendment, but I have two amendments to the Valentine amendment. I want to let the Chair know of that fact and at the appropriate time I want to be recognized to offer my two amendments to Mr. Valentine's amendment. I reserve the right to do so.

The **Chairman**. The Chair will protect the gentleman's right. He recognizes that the substitute now changes the format in which the gentleman's already previously presented amendment would need to be made. The Chair is only aware of one amendment that the gentleman had proposed, however.

Mr. Traficant. Mr. Chairman, I have a second amendment that is at the desk and could be distributed that deals with language in the findings section 1(a)(7).

The Chairman. The Chair will recognize Mr. Traficant first because he had already presented an amendment, to offer that amendment which now must be made to Mr. Valentine's amendment.

The gentleman is recognized.

Mr. Traficant. Mr. Chairman, the first amendment deals with section eight, entitled "Use of Domestic Products". The language simply states, without being a mandate, that "Each grant of Federal funds under this Act shall include a notice encouraging the recipient to acquire United States products as necessary to carry out the purposes of the grant." [Amendment 1.b. in Committee roster.]

It is not a forced mandate, but it is a notice of encouragement and to remind those grant recipients the money is coming from our Federal Government and to encourage them to purchase domestic products wherever possible.

The Chairman. Does the Chairman of the Subcommittee have any comment with regard to the amendment?

Mr. Valentine. Mr. Chairman, I would simply comment to say that I don't see any problem with the gentleman's amendment. We would be happy to accept it.

The Chairman. Is there any—

Mr. Ritter. Could I strike the last word, Mr. Chairman.

The Chairman. The Chair recognizes the gentleman.

Mr. Ritter. Just briefly, a great deal of excellent work in this field is going on in Japan, as the gentleman from Ohio ruefully knows. If Dr. Taguchi's program is for sale and in some ways fits the needs of high school or college students, we should not reject it out of hand.

The Chairman. The Chair feels that there is nothing in the gentleman's amendment that would compel us to reject anything out of hand. If there is no further debate, the Chair is prepared to put the motion on Mr. Traficant's amendment. All those in favor signify by saying aye.

[Chorus of ayes.]

Opposed, no. The ayes have it and the amendment is agreed to. Does the gentleman care to offer his second amendment?

Mr. Traficant. Yes, I do, Mr. Chairman.

The amendment, on page two, line 17, delete all through line 19 and insert in lieu thereof. This is section (6), previously (7). The existing language says "In more than 10 nations, average wages are now higher than in this country, where average wages have dropped in real terms by six percent since 1980."

The Traficant language states, "In more than 10 nations, average wages are now higher than in this country, where according to the Bureau of Labor Statistics, average wages dropped in real terms by 10 percent between the years 1979 and 1989."

I make this citation in the Bureau of Labor Statistics' widely reported documents and facts that have shown, in real terms, this type of an erosion of our wage base—

Mr. **Valentine**. Mr. Chairman, I don't mean to interrupt the gentleman's speech, but this has to do with a part of the recitation. It's not a matter of substance. As far as I'm concerned, we would accept the gentleman's amendment.

Mr. **Walker**. Mr. Chairman—

Mr. **Henry**. Mr. Chairman.

Mr. **Walker**. Mr. Chairman, this is inaccurate. This is not accurate.

The **Chairman**. The Chair would like to proceed in an orderly fashion. You have the amendment before you and you have heard Mr. Traficant's presentation.

The Chair will recognize Mr. Walker.

Mr. **Walker**. Mr. Chairman, I'm told that when we heard about this amendment yesterday, we checked with the Bureau of Labor Statistics and we were told, depending upon the measurement that you use, these statistics may or may not be correct. But in the form they are presented here, they are a statement of fact which the Bureau of Labor Statistics cannot back up.

I think we would be in a horrible position if what we're going to do is include in a piece of legislation absolutely inaccurate findings.

Mr. **Henry**. Mr. Chairman.

The **Chairman**. The Chair recognizes Mr. Henry.

Mr. **Henry**. I would ask the gentleman, my colleague from Ohio, to consider withdrawing the amendment, for the simple reason that making a point of this nature is not going to increase the likelihood of acceptance, of getting a very important bill before the Committee. The issue obviously is not just real wages but standard of living, tax rates, so on and so forth. It's a nice political point, but we already have enough politicization where we don't need it.

I really do believe the amendment, while I'm sure the gentleman has good intentions, is harmful to progress on the legislation before the Committee at this point in time.

Mr. **Traficant**. Will the gentleman yield?

Mr. **Henry**. I would be pleased to yield.

Mr. **Traficant**. I think the purpose of this particular bill, which is absolutely necessary in our country, addresses a fact of economic reality. I think we have skirted those issues with a number of nebulous, soft blows. The reason we are engaged in this type of legislative action is because of the tremendous erosion of income in real terms as compared to other industrialized nations.

Now, there was, in fact, an amendment that was offered here to strike this section because the six percent was not acceptable. I say that this amendment is right on target. The Bureau of Labor Statistics has published in a recently released—the National Center on Education and the Economy cites a Bureau of Labor Statistics study that showed it to be, in fact, since—

Mr. **Henry**. I'll reclaim my time, Mr. Chairman.

Just one closing comment. The question is whether we want to get a bill through here or have a long protracted debate on something which is really extraneous to the substance of the legislation. Thank you.

The **Chairman**. The Chair shares the views of the gentleman from Michigan.

Mr. Traficant. Mr. Chairman, if this amendment that is scheduled in the Walker schedule is to be withdrawn, covering this section of findings, I will unanimously ask for consent to withdraw my amendment as well. However, if the Walker amendment is going to continue to be offered, to strike that finding section, then I want to reserve the right to offer this amendment. [Amendment 29 in Committee amendment roster.]

I will yield to the Chairman.

Mr. Walker. Mr. Chairman, I don't know what Walker amendment he's talking about. I have just indicated here before that I am going to withdraw all of my amendments that have not been included in the en bloc amendment and I'm prepared to do that.

Mr. Traficant. Fine. With that understanding, I ask unanimous consent to withdraw the second amendment.

The Chairman. Without objection.

The Chair is prepared to recognize additional Members who have amendments. Mr. Ritter.

Mr. Ritter. Mr. Chairman, I have an amendment to the Valentine amendment. [Amendment 1.c. in Committee amendment roster.]

The Chairman. Is the amendment available to the Member, Mr. Ritter?

Mr. Ritter. I do believe it is, or it is being made available at the moment.

Mr. Chairman, if I might be recognized for five minutes on behalf of my amendment.

The Chairman. The Chair recognizes Mr. Ritter for five minutes in support of his amendment.

Mr. Ritter. Thanks, Mr. Chairman.

This amendment is basically an attempt to reflect some of the realities of what's going on out in the field in terms of TQM brought into the schools. It just seems to me that you can't really talk, as the original language does, about a model school, because what works at one school rather than at another school can be very different.

For example, in Sitka, Alaska, which we probably all heard about, with Total Quality brought into Mt. Edgecomb High School, it's a public school but it's the only public boarding school. Their key project was the production of high-quality salmon. The majority of the people are Eskimo Native Americans. It would be rather difficult to extrapolate that as the model school as the program that is taking place now in Phoenix, Arizona.

Mr. Valentine. Mr. Chairman.

Mr. Ritter. If I might just finish, we are looking for standardized criteria to identify what constitutes a Total Quality school, describing prospective roles of parents, students, teachers and administrators, State, local, and Federal governments, and the private sector. We're just kind of bringing some depth of focus into the gentleman from North Carolina's language with respect to what he has done, but also an attempt to complement what he has done.

The Chairman. Would the gentleman yield?

Mr. Ritter. I yield to the gentleman from North Carolina.

Mr. Valentine. Mr. Chairman, I undertook in the preceding amendment to say the chair would accept it in order to shorten the proceedings. This one, I don't want to accept it if there are other members on this side who have any serious objection to it. So let me just limit what I want to say.

For my part, as chairman of the subcommittee, I am willing to accept the gentleman's amendment.

The **Chairman**. The Chair has reviewed the amendment and recognizes the expertise of the gentleman from Pennsylvania on all matters involving total quality and is willing to accept it also.

Does anybody want to fly in the face of this overwhelming acceptance?

[Laughter.]

If not, the Chair will put the question. All those in favor signify by saying aye.

[Chorus of ayes.]

Opposed, no. The ayes have it and the amendment is accepted.

Mr. **Henry**. Mr. Chairman.

The **Chairman**. Mr. Henry.

Mr. **Henry**. Thank you, Mr. Chairman. I have an amendment to the amendment, which would simply delete amendment 23 in the Chairman's en bloc amendments. I will withdraw my amendment if Mr. Walker objects, after I give a brief explanation as to why I am offering an amendment to drop amendment 23.

Amendment 23 of Mr. Walker, which is incorporated in Mr. Valentine's en bloc amendment, seeks to ensure that purchased or leased equipment made available to participating institutions not be used for commercial purposes. I understand the Chairman's philosophical concerns about industrial policy, for lack of a better term.

I want to be sure that the gentleman from Pennsylvania understands that what we're talking about here are apprenticeship programs. Apprenticeship programs, by definition, involve very close ties between our community college and vocational tech programs, which often involve contract relationships with labor unions, educational institutions, and manufacturers.

A harsh prohibition on the use of this equipment for commercial purposes it seems to me could be overreaching. I raise the question because, if Mr. Walker objects, this is clearly a question which would fall again before the Energy and Commerce Committee. We have Members on both the Republican and Democratic side in this committee who serve on that committee who may want to revisit this.

The point of the language in the bill was not industrial policy but to facilitate a very free and open collaborative relationship between manufacturing science, the labor community, and educational institutions. I think, with that understanding, the gentleman from Pennsylvania may agree to the deletion of amendment 23. If not, I would withdraw my amendment.

The **Chairman**. The Chair will recognize the gentleman from Pennsylvania.

Mr. **Walker**. I'm not certain we have changed it that changes it materially from what you have said. I mean, I don't see that the change in language has really changed—

Mr. **Henry**. The gentleman's language simply says that none of the equipment leased or purchased shall be used for commercial purposes. Many internship programs, I can tell you, and apprenticeship programs are, in fact, commercial partnerships that involve the use of machinery and equipment for pieces that are put on the market. Just like a sheltered workshop, to which we give equipment, is used and people work at a special wage base. But the equipment is used for commercial sale.

Mr. **Walker**. Okay. Well, my guess is we can clarify that in report language. What I want to make certain of is that you don't have wholesale purchases of equipment that then are put out on the floor and used for regular commercial enterprises and so on, that, in fact, what we are getting is real training equipment here.

Mr. **Henry**. Indeed, though they are used for commercial enterprises where internships go through—I mean, I have a very elaborate program of exactly that type. It would not be uncommon—This is not broad industrial policy. There are contract relationships. For example, you bring in new equipment, and you take someone from plant A and you're training the workers at plant B, and they start knocking off the products. When they're up to export or sale level—Meanwhile, the plant is rehabilitated—

Mr. **Walker**. I don't have a problem, as long as they're part of a training program and that's what is being done. It seems to me we could write report language that clarifies all of that.

Mr. **Henry**. Very quickly, Mr. Chairman, the easiest way then would be to delete amendment 23 and have report language which clarifies it.

Mr. **Walker**. Okay, that's fine.

Mr. **Valentine**. Mr. Chairman.

The **Chairman**. The gentleman from North Carolina.

Mr. **Valentine**. This is another matter, Mr. Chairman. I would like to make a unanimous—

The **Chairman**. Let's first dispose of the amendment of the gentleman from Michigan. Do you have any objections to that?

Mr. **Valentine**. I do not, no, sir.

The **Chairman**. Any objections? If not, the amendment of the gentleman from Michigan will be accepted.

Mr. **Walker**. I think what we're doing, if I understand correctly, is the Valentine language, which was the Walker language that was added in the en bloc amendment, is now going back to the original language.

Mr. **Henry**. Yes, and that we will have report language clarifying the intent.

Mr. **Walker**. Okay. That's fine.

The **Chairman**. The Chair will assume that technical and other corrections will be made here in order to make it read properly and that report language will amplify on it.

The Chair now recognizes Mr. Valentine.

Mr. **Valentine**. Mr. Chairman, I ask unanimous consent to amend my amendment by including, on page nine, at line 23, after "section." the following language: "Funds authorized or otherwise made available for the scientific and technical research and services activities of the National Institute of Standards and Technology shall not be available for the purposes of this section." That addresses the problem that was discussed by Mr. Walker and it protects NIST from the diversion of any funds.

I ask unanimous consent that my amendment be adopted as altered by the addition of that language.

The Chairman. The effect of Mr. Valentine's unanimous consent request is to accept Mr. Walker's amendment that prohibits funds from being taken from NIST for this program.

Mr. Walker. We just want to make certain—We're dealing with so many pages here right now. We want to make certain that is going into the section of the bill on page 11 of the bill—

Mr. Valentine. It's page nine of the amendment, my amendment, page nine, line 12. [Amendment 23 in Committee roster.]

Mr. Walker. Okay, that's fine.

The Chairman. There being no objection, the unanimous consent request is agreed to.

Are there further amendments to be made at any point in—

Mr. Walker. Mr. Chairman.

The Chairman. Mr. Walker.

Mr. Walker. I don't have an amendment at this point. As I say, it is my intention, and I will do that right now, to ask unanimous consent that all the further amendments I have on the list be withdrawn at this point.

The Chairman. You have heard the request. Are there any objections? If not, the request is agreed to.

Mr. Walker. I just want to make one other point, and that is I did have an amendment in there that spoke to a question of language which is in the bill, the paragraph on page eight, line 18. This paragraph is the type of industrial policy that we have sought to avoid in other legislation, including the advanced technology bill.

The Secretary of Commerce, in my view, should not be in a position of being mandated to determine industries which are critical to our national economic security—in other words, pick winners and losers. I think we make a mistake moving in that direction. My guess is that this is something that's going to have to be corrected later on in the process. I just want to indicate my concern about it at the present time. We will not have a debate about it today and I will not offer such an amendment, but I don't want it to be said at some later date that this issue wasn't raised. I think it is an issue that needs to be understood would engender a great deal of opposition I think within the administration if it remains.

I yield back.

The Chairman. The Chair appreciates the gentleman's statement and will take cognizance of it.

If there are no further amendments to the Valentine amendment, it is in order to present that for a vote. Hearing no further amendments, the Chair presents the Valentine amendment. All those in favor signify by saying aye.

[Chorus of ayes.]

Opposed, no. The ayes have it and the amendment by Mr. Valentine in the nature of, but not quite, a substitute is accepted.

The Chair is prepared to have the presentation of committee views and report at this time.

Mr. Lewis. Mr. Chairman, I move H.R. 3507, as amended, and to instruct the staff to prepare the legislative report, to make technical and conforming amendments, and that the Chairman take all steps to bring the bill before the House for consideration.

The CHAIRMAN. You have heard the motion of the gentleman from Florida. All those in favor signify by saying aye.

[Chorus of ayes.]

Opposed, no. The motion is agreed to and the bill is reported.

[The prepared statements of Hon. Terry Bruce and Hon. Pete Geren, plus the Committee amendment roster and Appendix follow:]

OPENING REMARKS
THE HONORABLE TERRY L. BRUCE
AMERICAN INDUSTRIAL QUALITY AND TRAINING ACT OF 1991
NOVEMBER 22, 1991

THANK YOU, MR. CHAIRMAN. I COMMEND YOU AND MR. VALENTINE FOR BRINGING H.R. 3507 BEFORE US TODAY. THE COMPETITIVENESS OF THE AMERICAN WORKFORCE IS SOMETHING WE SHOULD ALL BE CONCERNED WITH, AND DEBATE. BUT WE MUST ALSO TAKE ACTION.

AMERICA NEEDS TO COMPETE WITH NOT ONLY LOW WAGE NATIONS LIKE MEXICO, TAIWAN, AND CHINA, BUT HIGH WAGE COUNTRIES LIKE GERMANY AND JAPAN. WE NEED TO FIND WHAT COUNTRIES LIKE GERMANY AND JAPAN ARE DOING TO TRAIN THEIR WORKFORCE AND MOVE TOWARD THAT GOAL. OBVIOUSLY, WHAT THIS GOVERNMENT HAS BEEN DOING THE LAST DECADE TO ENHANCE THIS COUNTRY'S COMPETITIVENESS IS VERY LITTLE, AND THAT HAS TO CHANGE NOW -- BEFORE THE U.S. BECOMES A SECOND RATE ECONOMIC POWER.

H.R. 3507, THE AMERICAN INDUSTRIAL QUALITY AND TRAINING ACT OF 1991, WILL ADDRESS MANY OF THIS NATION'S COMPETITIVE CONCERNS, IF ONLY THE PRESIDENT WOULD REALIZE THAT WHAT IS BEST FOR THE COUNTRY IS NOT ALWAYS WHAT HE BELIEVES. MANDATING GOVERNMENT PROGRAMS TO ENHANCE AND COORDINATE TECHNOLOGICAL AND VOCATIONAL TRAINING OF HIGH SCHOOL AND POSTSECONDARY STUDENTS IS NOT MANDATING AN INDUSTRIAL POLICY. IT IS ENSURING THE FUTURE OF THIS COUNTRY.

WITHOUT GOVERNMENT INVOLVEMENT IN THE COORDINATION OF SUCH TRAINING, THIS COUNTRY WILL ONLY SLIP DEEPER INTO THE CURRENT ECONOMIC RECESSION. IF SUCH COORDINATION CAN WORK OVERSEAS, IN COUNTRIES SUCH AS GERMANY AND JAPAN, COUNTRIES WHICH ONLY FORTY

YEARS AGO HAD COMPLETELY DESTROYED ECONOMIES AND INFRASTRUCTURES, IT CAN HAPPEN HERE. IF WE CAN TEACH THE GERMANS AND JAPANESE OUR SKILLS OF FORTY YEARS AGO, THEN WE OUGHT TO BE GOOD TEACHERS BY BEING WILLING TO LISTEN AND LEARN, AS WELL AS TEACH. THE ADMINISTRATION NEEDS TO REALIZE THAT IT DOES NOT HAVE ALL THE ANSWERS, AND THE ONLY REGRESSIVE STEP WE CAN TAKE NOW, IS TO DO NOTHING.

I STRONGLY SUPPORT H.R. 3507, MR. CHAIRMAN, AND I HOPE THAT MY COLLEAGUES WILL ALSO.

THE HONORABLE PETE GEREN
OPENING STATEMENT
MARKUP OF H.R. 3507
NOVEMBER 22, 1991

Mr. Chairman, I understand that the American Workforce Quality Partnerships Program can be used by a company that is in the process of downsizing it's workforce due to changing economic circumstances, to retrain it's workers for other highly skilled employment. For example, an employee who is trained to build aircraft components can be retrained to manufacture computer chips.

In the 12th Congressional District, Fort Worth, Texas, which I represent, 12,000 highly skilled aerospace workers have been forced to look for employment in other highly technical areas. They need additional training to compete for these new jobs.

The American Workforce Quality Partnerships Program establishes new centers for advanced technical and industrial skills training. These partnerships would include local community and technical colleges and other institutions of higher education in the locality or the region.

One outcome of each funded partnership is that the education partners would gain substantial enhancement of their ability to train not only partnership-affiliated workers but many other individuals in the latest and most advanced industrial technologies.

In addition, the Partnership Program gives priority consideration to those industries that are critical to the military or economic future of the nation, or those industries where foreign competition is deemed particularly intense.

There is no doubt that this program would benefit both the workers and the businesses in my district or any other district in this nation. Therefore, I strongly support H.R. 3507 and urge my colleagues to do the same.

COMMITTEE MARKUP
November 22, 1991
MARKUP RESULTS

	Result
I. Measure: H.R. 3507, American Industrial Quality and Training Act of 1991	Reported, amended, by voice vote

Amendments

	Sponsor	Description	Result
1.	Mr. Walker	Amendment striking "Findings" section and replacing it with a requirement for feasibility report.	Withdrawn
1.a.	Mr. Valentine	Technical and Conforming amendment.	Adopted, amended, by voice vote
1.b.	Mr. Traficant	Amendment to Valentine amendment: "Use of Domestic Products."	Adopted by voice vote
1.c.	Mr. Ritter	Amendment to Valentine amendment: Amends Section 7 - Report on Total Quality School.	Adopted by voice vote
2.	Mr. Walker	Amendment to "Findings" section 1(a)(1).	Incorporated into Valentine amendment
3.	Mr. Walker	Amendment to "Findings" section 1(a)(2).	Incorporated into Valentine amendment
4.	Mr. Walker	Amendment to "Findings" section 1(a)(3).	Incorporated into Valentine amendment
5.	Mr. Walker	Amendment to "Findings" section 1(a)(4).	Incorporated into Valentine amendment
6.	Mr. Walker	Amendment to "Findings" section 1(a)(5).	Incorporated into Valentine amendment
7.	Mr. Walker	Amendment to "Findings" section 1(a)(7).	Withdrawn
8.	Mr. Walker	Amendment deleting Finding 1(a)(8).	Incorporated into Valentine amendment

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9.	Mr. Walker	Amendment to "Findings" section 1(a)(10).	Incorporated into Valentine amendment
10.	Mr. Walker	Amendment to "Purposes" section 1(b)(4).	Incorporated into Valentine amendment
11.	Mr. Walker	Amendment striking Section 3.	**Withdrawn**
12.	Mr. Walker	Amendment to Section 3 changing Secretary of Commerce to Secretary of Labor.	**Withdrawn**
13.	Mr. Walker	Amendment removing grant responsibility from the Technology Administration Office.	Incorporated into Valentine amendment
14.	Mr. Walker	Amendment to subsection 3(a).	Incorporated into Valentine amendment
15.	Mr. Walker	Amendment to subsection 3(d).	Incorporated into Valentine amendment
16.	Mr. Walker	Amendment to subsection 3(f)(2).	Incorporated into Valentine amendment
17.	Mr. Walker	Amendment to subsection 3(f)(2)(D).	Incorporated into Valentine amendment
18.	Mr. Walker	Amendment striking subsection 3(f)(2)(F).	Incorporated into Valentine amendment
19.	Mr. Walker	Amendment to subsection 3(f)(3)(A)(iii).	Incorporated into Valentine amendment
20.	Mr. Walker	Amendment to subsection 3(f)(3)(A)(iv).	Incorporated into Valentine amendment
21.	Mr. Walker	Amendment striking subsection 3(f)(3)(B).	**Withdrawn**
22.	Mr. Walker	Amendment replacing subsection 3(g)(1)(A).	Incorporated into Valentine amendment
23.	Mr. Walker	Amendment replacing subsection 3(g)(1)(B).	**Modified**, incorporated into Valentine amendment
24.	Mr. Walker	Amendment striking subsection 3(g)(1)(D) and amending subsection 3(g)(2).	Incorporated into Valentine amendment

25.	*Mr. Walker*	***Amendment to subsection 3(h)(C).***	***Incorporated into Valentine amendment***
26.	*Mr. Walker*	***Amendment striking subsection 3(h)(2)(C)(i).***	***Withdrawn***
27.	*Mr. Walker*	***Amendment to subsection 3(h)(2)(C)(i).***	***Adopted, as modified, by unanimous consent***
28.	*Mr. Walker*	***Amendment striking Section 7.***	***Withdrawn***
29.	Mr. Traficant	Buy American.	Withdrawn

	Result
II. Measure: H.R. 191, Technology Transfer Improvements Act of 1991	***Reported by voice vote***

Amendment in the Nature of a Substitute
Offered by Mr. Walker
to H.R. 3507

On page 1, strike all after line 3 through page 21, and substitute in lieu thereof:

"SEC. 2. REPORT TO THE PRESIDENT AND CONGRESS

(a) The Secretary of Commerce, the Secretary of Labor, and the Secretary of Education shall issue a joint report on the feasibility and advisability of a federal program which would:

(1) provide America's youth with advanced industrial, technological, and management skills in order to further global competitiveness and provide the Nation's young people with an opportunity to achieve higher living standards;

(2) encourage private sector United States manufacturing and technology-based enterprises to adopt total quality management practices and such other strategies as may further global competitiveness;

(3) further the ability of community and technical colleges and other two-year institutions of higher education to train individuals who wish to pursue advanced technological and industrial skills;

(4) encourage State governments to fully develop their technical education and technician training activities into State-wide systems that respond to the social, technological, and economic needs of localities and the State;

(5) collect, in a systematic way, statistics on the annual expenditure of United States companies on formal worker training programs; and

(6) study the feasibility of applying the concepts of total quality management to the operation of secondary and postsecondary educational institutions.

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The report shall be issued to the President and the Congress one year after the date of enactment of this Act.

(b) The report shall take into consideration those programs which already exist at the federal, state and local government level, in the private sector, and through educational community to accomplish the goals in subparagraphs 1 through 6."

✓ adopted, amended 1.a. voice vote

VALENT008

AMENDMENT TO H.R. 3507
OFFERED BY MR. VALENTINE

Strike page 1, line 6, through page 21 line 25, and insert in lieu thereof the following:

(1) The position of the United States workforce in the world economy will face ever greater challenges from foreign workers in years to come as more and more advanced industrial and technical skills training is provided.

(2) For the past 20 years, the economy of the United States has grown through a large expansion in the labor force and technology. In the 1990s, the population of the United States is expected to grow at a rate slower than any time since the 1950s. As a result, American industry will have to achieve greater productivity rates through technological development in order to fuel economic expansion.

(3) Few professional job opportunities are available for noncollege-bound youth; instead they settle into lower wage jobs for a period of several years before advancing to more career-oriented positions.

(4) Fifty percent of our nation's graduating high school seniors do not pursue postsecondary education and

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nearly 25 percent of all high school students do not graduate, due, in part, to a lack of career relevance of their high school education.

(5) Presently, the United States does not have a centralized system to provide noncollege-bound youth with opportunities to develop advanced skills for the modern workplace; instead, as a nation, we try to meet our workforce training needs through many individual programs.

(6) Experts estimate that between two-thirds and three-quarters of the workforce of the year 2000 is already working today, demonstrating the need to train and retrain our existing workforce.

(7) In more than 10 nations, average wages are now higher than in this country, where average wages have dropped in real terms by 6 percent since 1980.

(8) Some United States companies have been very successful at furthering their competitive positions through a renewed attention to worker training, the redefinition of worker responsibilities, and the adoption of total quality or similar competitiveness-oriented strategies.

(9) The Federal Government does not keep complete, comprehensive statistics on worker training.

(b) PURPOSE.--It is the purpose of this Act--

(1) through apprenticeship-like experiences, to provide America's youth with advanced industrial, technological, and management skills in order to further industrial global competitiveness and provide the Nation's young people with an opportunity to achieve high living standards;

(2) to encourage private sector United States manufacturing and technology-based enterprises to adopt total quality management practices and such other strategies as may further global competitiveness;

(3) to further the ability of community and technical colleges and other 2-year institutions of higher education to educate and train individuals who wish to pursue advanced technological and industrial skills;

(4) to encourage State governments to fully develop their technical education and technician training activities into unified State-wide systems that respond to the social, technological, and economic needs of localities and the State;

(5) to collect, in a systematic way, statistics on the annual expenditure of United States companies on formal worker training programs; and

(6) to study the feasibility of applying the concepts of total quality management to the operation of secondary and postsecondary educational institutions.

SEC. 3. AMERICAN WORKFORCE QUALITY PARTNERSHIPS.

(a) PROGRAM AUTHORIZED.--The Secretary of Commerce may make grants to eligible applicants having applications approved under this section to establish and operate American workforce quality partnership programs in accordance with the provisions of this section. The Secretary of Commerce shall award grants on a competitive basis to pay the Federal share for American workforce quality partnership programs to establish workforce training consortia between industry and institutions of higher education.

(b) GRANT PERIOD.--Grants awarded under this section may be for a period of 5 years.

(c) GENERAL AUTHORITY.--Each grant recipient shall use amounts provided under the grant to develop and operate an American workforce quality partnership program.

(d) CONTENTS OF PROGRAM.--An American workforce quality partnership program shall establish partnerships between one or more technology-based or manufacturing sector firms and a local community or technical college or other appropriate institutions of higher education to train the employees of the industrial partners through both workplace-based and classroom-based programs of training.

(e) FEDERAL SHARE.--The Federal share of the cost of an American workforce quality partnership program may not exceed 50 percent of the total cost of the program. The non-Federal

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share of such costs may be provided in-cash or in-kind, fairly valued. The total contribution of the proposed partnership should reflect a substantial contribution on the part of the industrial partners and appropriate contributions of the education partners, local or State governments, and other appropriate entities.

(f) APPLICATIONS.--

(1) IN GENERAL.--Each eligible applicant that desires to receive a grant under this section shall submit an application to the Secretary of Commerce at such time and in such manner as the Secretary shall prescribe.

(2) PLAN.--Each application submitted under this subsection shall contain a plan for the development and implementation of an American workforce quality partnership program under this section. Such plan shall--

(A) show a demonstrated commitment, on the part of the industrial partners, to adopt total quality management strategies or other plausible strategies to renew its competitive edge;

(B) demonstrate the need for Federal resources because of the long-term nature and risk of such a investment, the inability to finance such ventures because of the high cost of capitalization, intense competition from foreign industries, or such other appropriate reasons as may limit the industrial

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partners' ability to launch programs where worker training and development is a substantial component;

(C) demonstrate long-term benefit for all partners and the local economy, through an enhanced competitive position of the industrial partners, substantial benefits for regional employment, and the ability of the education partners to further their capabilities to educate and train other nonpartnership-affiliated individuals wishing to obtain or upgrade technical, technological, industrial management and leadership, or other industrial skills;

(D) make full, appropriate, and innovative use of industrial and higher education resources and other local resources such as facilities, equipment, personnel exchanges, experts, or consultants;

(E) provide for the establishment of an advisory board in accordance with subsection (h); and

(F) include an explanation of the industrial partners' plans to adopt new competitive strategies and how the training partnership aids that effort.

(3) APPROVAL.--The Secretary of Commerce shall approve applications based on their potential to create an effective American workforce quality partnership program in accordance with this section.

-11-

(A) CRITERIA.--In reviewing grant applications, the Secretary of Commerce shall give significant consideration to the following criteria:

(i) Saliency of argument for requiring a Federal investment.

(ii) Commitment of partnership to continue operation after the termination of Federal funding.

(iii) The likelihood that the training will lead to long-term competitiveness of the industrial partners and contribute significantly to economic growth.

(iv) The likelihood that the partnership will benefit the education mission of the education partners in ways outside of the scope of the partnership, such as developing the capability to train other nonpartnership-affiliated individuals in similar skills.

(B) PRIORITY CONSIDERATION.--The Secretary of Commerce shall give priority consideration to industries which are threatened by intense foreign competition important to the long-term national economic or military security of the United States and industries which are critical in enabling other United States industries to maintain a healthy competitive position.

(g) USE OF FUNDS.--

(1) APPROVED USES.--Federal funds may be used for--

(A) the direct costs of workplace-based and classroom-based training in advanced technical, technological, and industrial management, skills, and training for the implementation of total quality management strategies, or other competitiveness strategies, contained in the plan;

(B) the purchase or lease of equipment or other materials for the purpose of instruction to aid in training; ~~but not for commercial purposes.~~ as modified by (Henry u. consent)

(C) the development of in-house curricula or coursework or other training-related programs; and

(D) reasonable administrative expenses and other indirect costs of operating the partnership which may not exceed 20 percent of the total cost of the program.

(2) LIMITATIONS.--Federal funds may not be used for nontraining related costs of adopting new competitive strategies including the replacement of manufacturing equipment, product redesign and manufacturing facility construction costs, or salary compensation of the partners' employees.

(h) ADVISORY BOARD.--

(1) Each partnership shall establish an advisory board which shall include representation from multiple organizational levels of the industrial partners, the education partners, labor union representatives if a unionized workforce, and such other representatives and experts as may be appropriate or necessary.

(2) The advisory board shall--

(A) advise the partnership on the general direction and policy of the partnership including training, instruction, and other related issues;

(B) report to the Secretary of Commerce after the second and fourth year of the program, on the progress and status of the partnership, including its strengths, weaknesses, and new directions; and

(C) assist in the revision of the plans (submitted with the application under subsection (f)(2)(F)) and include revised plans as necessary in the reports under subparagraph (B).

(i) AUTHORIZATION OF APPROPRIATIONS.--There are authorized to be appropriated $50,000,000, from sums otherwise authorized to be appropriated, for each of the fiscal years 1992 through 1996 to carry out the purposes of this section.

SEC. 4. YOUTH TECHNICAL APPRENTICESHIP PROGRAMS.

(a) PROGRAM AUTHORIZED.--The Secretary of Labor is authorized to make grants to eligible applicants having applications approved under this section to establish programs to be known as youth technical apprenticeship programs in accordance with the provisions of this section. The Secretary of Labor shall award grants on a competitive basis to pay the Federal share for youth technical apprenticeship programs.

(b) GENERAL AUTHORITY.--Each grant recipient shall use amounts provided under the grant to develop and operate a youth technical apprenticeship program.

(c) CONTENTS OF PROGRAM.--A youth technical apprenticeship program shall--

(1) establish 3- or 4-year apprenticeship-like programs consisting of 2 years of secondary school preceding graduation and 1 or 2 years of postsecondary education with a common core of proficiency in mathematics, science, social science, and English and more applied technical, technological, industrial management and leadership, or other industrial skills designed to lead to an associate degree or other certificates of technical skills accomplishment;

(2) provide youth with stipended or salaried rotational work assignments within a specific manufacturing or technology-based company for the length of the program period for the purpose of broadly training

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youth in a variety of related technical, technological, industrial management and leadership, or other industrial skills;

(3) ensure that classroom and apprenticeship-like experiences are well coordinated, complementary, and relevant;

(4) make allowance and provision for those youth who may desire to advance to 4-year institutions of higher education, in lieu of career entry, upon successful completion of the apprenticeship-like experience;

(5) broadly educate and train youth program participants for skilled primary occupations in a variety of areas;

(6) be designed to have a substantial impact in terms of the number of students affected or geographic region served by the program;

(7) demonstrate a commitment to continue operation after termination of Federal funding;

(8) contribute substantially to the ability of local industry participants to obtain appropriately trained workers;

(9) be developed in accordance with local or regional economic development policies and with advice from appropriate local and State entities; and

(10) establish an advisory board in accordance with

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subsection (f).

(d) APPLICATIONS.--

(1) ELIGIBLE APPLICANTS.--Youth technical apprenticeship grants shall be awarded to nonprofit organizations representing labor, industry, or education or consortia of such organizations, or other appropriate entities as determined by the Secretary of Labor for periods of not more than 4 years.

(2) IN GENERAL.--Each eligible applicant that desires to receive a grant under this section shall submit an application to the Secretary of Labor at such time and in such manner as the Secretary shall prescribe.

(3) PLAN.--Each application submitted under this subsection shall contain a plan for the development and implementation of a youth technical apprenticeship program under this section. The plan shall include an explanation of how the program will continue to operate after the termination of Federal funds.

(4) APPROVAL.--The Secretary of Labor shall approve applications based on their potential to create an effective youth technical apprenticeship program in accordance with the provisions of this section.

(5) SPECIAL CONSIDERATION.--The Secretary of Labor shall give special consideration to applications which provide for the contribution of non-Federal funds.

(e) PLANNING GRANTS.--The Secretary of Labor shall award one time, one-year planning grants on a competitive basis to eligible applicants to apply for youth technical apprenticeship program grants, to develop full-scale plans and proposals for the program, and for other planning costs associated with applying for such grants and developing such programs. No planning grant under this subsection may exceed $50,000. At the discretion of the Secretary of Labor, planning grants may be awarded to organizations for the purpose of planning local youth apprenticeship programs not funded under this section.

(f) ADVISORY BOARD.--

(1) ESTABLISHMENT AND FUNCTIONS.--Each entity that is awarded a grant under subsection (d) shall establish an advisory board. The advisory board shall advise the youth technical apprenticeship program on general direction and policy.

(2) MEMBERSHIP.--An advisory board shall be composed as follows:

(A) 75 percent of the membership shall be individuals representing the secondary school systems, institutions of higher education, and companies that participate in the program and shall include at least one youth apprentice, and one representative from the grant recipient organization

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to serve ex-officio.

(B) 25 percent of the membership shall be individuals who are representative of groups not directly affiliated with the program but who have knowledge and expertise in the area of education, business and management, and technology or other relevant areas, such as educational experts, experts involved in the operation of other nonfederally funded apprenticeship programs, and officers and employees of State or local government.

(3) ANNUAL REPORT.--The advisory board shall submit annually to the Secretary of Labor a report concerning the progress, status, strengths, and weaknesses of the apprenticeship program.

(g) USE OF FUNDS.--

(1) Federal funds under this section may not be used to pay any stipend or salary to a participant in a youth technical apprenticeship program.

(2) Federal funds may be used for the following purposes:

(A) The development of complementary programs of study between participating secondary and postsecondary institutions of education, including coursework, seminars, student counseling, and mentorship.

(B) The development of industrial work programs that are well coordinated with student classroom experiences.

(C) Direct and indirect costs associated with the expenses of operating the program.

(h) CLEARINGHOUSE.--The Secretary of Labor, together with other appropriate entities, shall establish and maintain at the Department of Labor, or by contract, a readily accessible inventory of youth apprenticeship programs in the United States for the use of individuals or organizations that wish to learn more about or establish youth apprenticeship programs.

(i) AUTHORIZATION OF APPROPRIATIONS.--There are authorized to be appropriated $50,000,000, from sums otherwise authorized to be appropriated, for each of the fiscal years 1992 through 1996 to carry out the purposes of this section.

SEC. 5. STATEWIDE TECHNICAL EDUCATION AND TRAINING NETWORKS.

(a) GENERAL AUTHORITY.--The Secretary of Education is authorized to make grants on a competitive basis to State governments to pay the Federal share of the cost of programs under subsection (b).

(b) CONTENTS OF PROGRAM.--The Secretary of Education shall make grants to establish statewide technical education and training networks to develop plans or strategies to establish statewide systems for the provision of technical, technician, or technological skills and education by building upon Federal, State, and local programs through such methods as--

(1) reviewing the extent to which articulation agreements are used and can be used between 2- and 4-year institutions of higher education and between high schools and work-based learning, vocational, and technical skill and education programs in order to provide effective links between education levels;

(2) the examination of existing programs or the exploration of new programs to fill training needs that currently go unmet or serve populations which are currently underserved;

(3) the evaluation and review of programs with the intention of identifying the most effective and efficient means to achieve training goals;

(4) efforts to encourage renewed cooperation of the private sector in assisting in programs that fulfill the training needs of the State; and

(5) the planning of unified systems that provide citizens of the State who do not currently wish to pursue bachelor or advanced degrees a clear and identifiable path to careers in technical areas with the purpose of achieving comfortable living standards.

(c) Submission of Applications.--Applications shall be submitted through the chief executive officer of the State.

(d) Federal Share.--Federal funds provided under this section may not exceed 50 percent of the total cost of establishing a statewide technical education and training network.

(e) Report.--Not later than 3 years after the award of a grant under this section, the chief executive officer of a State shall submit a report to the Secretary of Education evaluating the achievements of, and difficulties in unifying on a statewide basis, Federal, State, and local programs and suggest ways in which the Federal Government could improve its programs in order to better meet the training needs of the citizens of the State.

(f) Definition.--For the purposes of this section, the term ``State'' includes the District of Columbia, and the Commonwealth of Puerto Rico.

(g) Authorization of Appropriations.--There are authorized to be appropriated $15,000,000, from sums otherwise authorized to be appropriated, for each of the fiscal years 1992 through 1996 to carry out the purposes of this section.

SEC. 6. INDUSTRY WORKER TRAINING INFORMATION.

(a) General Authority.--The Secretary of Labor, in conjunction and consultation with the Small Business

Administration and other relevant agencies, shall compile information and statistical data, at the Department of Labor or by contract, on the total annual expenditure of United States industry on formal worker training programs, quantity of training, and other relevant worker training information in the following areas--

(1) by firm size: for example, small, medium, and large companies;

(2) by and within sector: for example, service and manufacturing;

(3) by industry, such as--

(A) automobiles;

(B) financial;

(C) computer software and hardware;

(D) steel and other process and natural resource-based industries; and

(E) consumer electronics;

(4) by job classification, such as--

(A) marketing;

(B) sales;

(C) professionals;

(D) first-line supervisors;

(E) middle managers;

(F) executives;

(G) production workers; and

(H) officer workers;

(5) by purpose of training, such as--

(A) entry level;

(B) skills upgrading; and

(C) training for advancement; and

(6) any other data such as international comparative data that may be available and appropriate.

(b) REPORT TO CONGRESS.--The Secretary of Labor shall submit biennally a report to the Congress providing such information and statistical data in a useful format. The Secretary shall also make such information available to United States industry.

(c) AUTHORIZATION.--There are authorized to be appropriated, from sums otherwise authorized to be appropriated, sums as may be necessary for each of the fiscal years 1992 through 1996 to carry out this section.

Replace with letter amendment I.C.

~~**SEC. 7. REPORT ON TOTAL QUALITY SCHOOLS.**~~

~~(a) REPORT TO CONGRESS.--Not later than 180 days after the date of enactment of this Act, the Secretary of Education, in conjunction with the Secretary of Commerce, shall submit to the Congress a report on the feasibility of adopting principles of total quality management, as embodied by the Malcolm Baldrige National Quality Award, to improve the quality and relevance of secondary and postsecondary education.~~

~~(b) CONTENT.--The report under subsection (a) shall include--~~

~~(1) a description of a model ``total quality school'', including a description of the roles of parents, students, teachers, administrators, government, the private sector, and any other relevant entities;~~

~~(2) possible positive and negative effects of a total quality-influenced curriculum on education and student learning, including an analysis of the costs and benefits of the adoption of total quality approaches to education;~~

~~(3) Federal, State, and local policy options and their barriers to implementation; and~~

~~(4) any specific recommendations of the Secretaries for congressional action.~~

Insert new section "Use of Domestic Products" (Traficant amendment 1.6.

EXPLANATION OF VALENTINE AMENDMENT #1A

The purpose of this amendment is simple. It incorporates the text of the bill as reported from the Subcommittee, as well as 20 of Mr. Walker's amendments as listed on the amendment roster. These Walker amendments are as follows: numbers 2, 3, 4, 5, 6, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, and 25.

#23 modified

TRAFIC065

✓ adopted 1.6. voice vote

AMENDMENT TO Valentine H.R. 3507 amend-ment to
OFFERED BY MR. TRAFICANT

Page 20, after line 14, insert the following new section:

1 **SEC. 8.** USE OF DOMESTIC PRODUCTS.

Each grant of Federal funds under this Act shall include a notice encouraging the recipient to acquire United States products as necessary to carry out the purposes of the grant.

✓ adopted: - I.C.
voice vote

AMENDMENT OFFERED BY MR. RITTER
TO H.R. 3507
(Section 7 - Report on Total Quality Schools)

[redacted]

Page 19 line 17, through page 20, line 14, amend section 7 to read as follows:

"SEC. 7. REPORT ON TOTAL QUALITY SCHOOLS.

(a) REPORT TO CONGRESS. - Not later than 180 days after enactment of this Act, the Secretary of Education, in conjunction with the Secretary of Labor and the Secretary of Commerce, shall submit to the Congress a report on the feasibility of encouraging the adoption of Total Quality Management principles to improve the quality and relevance of primary, secondary, and postsecondary education, through the establishment of an award comparable to the Malcolm Baldrige National Quality Award.

(b) CONTENT. - The report under subsection (a) shall include descriptions of -

(1) standardized criteria to identify a Total Quality school, including a description of the respective roles of parents, students, teachers, administrators, state, local and federal governments, the private sector, and other customers of the educational system;

(2) a model for the standardization of a Total Quality curriculum, including where possible descriptions of the appropriate use of Total Quality principles in the content, development, and delivery of such a curriculum;

(3) the extent to which the Malcolm Baldrige National Quality Award criteria may be used as a guideline for establishment of an award for quality in education;

(4) the effects of a curriculum embodying Total Quality Management principles on education and student learning, including an analysis of the costs and benefits of the adoption of Total Quality approaches to education; and

(5) specific recommendations of the Secretaries for Congressional action.

(c) TOTAL QUALITY SCHOOL. – For the purposes of this section, a "Total Quality school" is a school employing the principles of Total Quality Management to improve the quality and relevance of the educational experience.

PURPOSE OF THE AMENDMENT: The amendment would clarify that the embodiment of Total Quality Management principles in the educational system is already underway, and would help encourage these efforts by focusing study efforts on the potential for establishment of an award for Quality in education similar to the Malcolm Baldrige National Quality Award.

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AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 1, line 6, delete all through line 11 and insert in lieu thereof:

"(1) The position of the United States workforce in the world economy will face ever greater challenges from foreign workers in years to come as more and more advanced industrial and technical skills training is provided."

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✓ 3.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 1, line 14, after "force" insert "and technology".

Page 1, line 17, delete "vastly" and after "rates" insert "through technological development."

✓ 4.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 1, line 19, delete "primary" and insert in lieu thereof "professional".

Page 1, line 21, delete "low-wage, low skill, secondary labor market" and insert in lieu thereof "lower wage".

✓ 5.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 2, lines 4 and 5, delete "drop out altogether" and insert in lieu thereof " do not graduate".

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✓ 6.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 2, line 7, delete "has no formal" and insert in lieu thereof "does not have a centralized"

Page 2, line 11, delete "disconnected".

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Withdrawn 7.

AMENDMENT OFFERED BY MR. WALKER TO H.R. 3507

Page 2, line 17, strike all through line 19, and renumber the following subparagraphs accordingly.

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✓ 8.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 2, line 20, strike all through line 25 and renumber the following subparagraph accordingly.

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✓ 9.

AMENDMENT OFFERED BY MR. WALKER
OFFERED TO H.R. 3507

Page 3, line 8 after "training", strike all through line 11 and insert in lieu thereof "."

✓ 10.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 4, line 2 strike "restructure and".

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Withdrawn 11.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 4, line 13, strike all through Page 11, line 9 and renumber the following sections accordingly.

-14-

Withdrawn 12.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 4, lines 14 and 15, strike "Secretary of Commerce, through the Technology Administration," and insert in lieu thereof "Secretary of Labor".

Page 4, line 19, strike "Commerce" and insert in lieu thereof "Labor".

Page 5, line 24, strike "Commerce" and insert in lieu thereof "Labor."

Page 7, line 19, strike "Commerce" and insert in lieu thereof "Labor."

Page 7, line 24, strike "Commerce" and insert in lieu thereof "Labor."

Page 8, line 19, strike "Commerce" and insert in lieu thereof "Labor."

Page 10, line 22, strike "Commerce" and insert in lieu thereof "Labor."

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✓ 13.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 4, line 15, strike "through the Technology Administration,

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✓ 14.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 4, line 15, strike "is authorized to" and insert in lieu thereof "may".

✓ 15.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 5, line 8 after "train" strike all through "levels" on line 10, and insert in lieu thereof, "the employees of the industrial partners".

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✓ 16.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 6, line 6, after "to", strike all through "or" on line 8, and insert in lieu thereof, "adopt".

Page 6, line 13, strike "restructuring".

Page 6, line 18, strike "restructuring".

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✓ 17.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 7, line 8, after "consultants" strike all through line 11 and add ";".

✓ 18.

AMENDMENT OFFERED BY MR. WALKER TO H.R. 3507

Page 7, strike lines 14 and 15, and reletter the subsequent subparagraph accordingly.

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✓ 19.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 8, lines 6 and 7, strike "competitive strategy" and insert in lieu thereof "training."

Page 8, strike lines 9 and 10, and insert in lieu thereof "significantly to economic growth."

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✓ 20.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 8, line 15 strike "infrastructure or".

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Withdrawn 21.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 8, line 18, strike all through line 25.

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✓ 22.

AMENDMENT OFFERED BY MR. WALKER
H.R. 3507

Page 9, line 3, strike all through line 11, and insert in lieu thereof the following:

(A) the direct costs of workplace-based and classroom-based training in advanced technical, technological, and industrial management, skills and training for the implementation of total quality management strategies, or other competitiveness strategies, contained in the plan;

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Adopted after bracketed language was struck. 23.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 9, line 12, strike all through line 16, and insert in lieu thereof the following:

"(B) the purchase or lease of equipment or other materials for the purpose of instruction to aid in training, but which shall not be used for commercial purposes;"

✓ 24.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 9, line 19 strike all through line 24 and reletter the following subparagraph accordingly.

Page 10, line 8, after "compensation" strike all through line 10 and insert in lieu thereof "of the partners' employees."

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✓ 25·

AMENDMENT OFFERED BY MR. WALKER
H.R. 3507

Page 11, line 1, strike "strategic".

Page 11, line 3, strike "such".

Page 11, line 3, after "plans" insert "as necessary".

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✓ 26.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 11, line 5, strike all through line 9.

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Adopted after bracketed language was struck, 27.

AMENDMENT OFFERED BY MR. WALKER TO H.R. 3507

[Page 11, line 8, strike "1996" and insert in lieu thereof "1993".]

Page 11, line 9, after "section.", add the following:

"Funds authorized or otherwise made available for the scientific and technical research and services activities of the National Institute of Standards and Technology shall not be available for the purposes of this section."

✓ 28.

AMENDMENT OFFERED BY MR. WALKER
TO H.R. 3507

Page 21, line 3, strike all through line 25.

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Withdrawn 29.

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AMENDMENT TO H.R. 3507
OFFERED BY MR. TRAFICANT

Page 21, after line 25, insert the following new section:

SEC. 8. BUY AMERICAN.

Each grant of Federal funds under this Act shall include a notice encouraging the recipient to acquire United States products as necessary to carry out the purposes of the grant.

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APPENDIX

Testimony on

National Competitive Industry Workforce Act of 1991
and
Technical Education and Training Act of 1991

By

ROBERT W. SCOTT
President
North Carolina Community College System
State Board of Community Colleges
Raleigh, North Carolina

Presented to

House Subcommittee on Technology and Competitiveness Hearing
Washington, DC

September 17, 1991

This testimony is being presented on the National Competitive Industry Workforce Act of 1991 and the Technical Education and Training Act of 1991.

The National Competitive Industry Workforce Act of 1991 provides the legislative mechanism of a science and technical education road map for today's students. I speak on behalf of community colleges and their mission to educate and train a competitive workforce. Community colleges were created to educate and train a competitive workforce. The two most significant tasks that the North Carolina Community College System faces in this decade are skills training and literacy training for the present and future workforce. We always talk about the future of the workplace, but we often forget that 75 percent of all workers who will be North Carolina's workforce in the year 2000 are already there. And 80 percent of the new entrants will be women, minorities, and immigrants, most of whom will need training.

Today's jobs, at a minimum, require workers to possess certain basic skills. These are the skills that have come to be known as functional literacy skills: the ability to write, to read, to compute, and to think critically and make decisions; the capability to work with others; and perhaps most importantly, the capacity to pursue and to benefit from further technical training.

North Carolina's community college system is a national leader in providing workplace literacy instruction at business and industry sites across the state. At present, the system has more than 391 workplace literacy sites with over 1,300 classes. There would be even more classes operating if we had the funding. These classes are free and are offered at times convenient to the employer and employees.

Section 4 of the act provides for a Youth Technical Apprenticeship Program and would provide apprenticeship-like programs consisting of two years of secondary school and one or two years of postsecondary education. This program would be similar to the Tech-Prep program that is operating so successfully in North Carolina and other states and which is contained in the Carl Perkins Vocational and Applied Technology Education Act. Although I would prefer that the program be called something other than an "Apprenticeship Program," I support the concept and commend Chairman Valentine for including it in his bill. Any measure to improve articulation between the secondary and postsecondary systems is a welcome and worthy influence.

I also support Section 5 of the act which would establish the "Competitive American Workforce Development Partnership." The North Carolina Center for Applied Textile Technology, which is affiliated with the North Carolina Community College System, has established a partnership with the state's textile industry; and grants from the Secretary of Commerce would strengthen this and other industry-education consortia. The Focused Industrial Training (FIT) Program that our colleges use to retrain workers in traditional industries could become a demonstration model under Section 5 of the act. Before the end of this calendar year, one of our community colleges will be awarded a special grant to establish and operate a Quality and Productivity Improvement Center, concentrating on programs to support the quality initiatives in business and industry. Synergistic efforts like this and others which would be stimulated by the bill will make stronger companies and stronger colleges.

Section 6 of the act would make grants to establish "Statewide Technical Education and Training Planning Networks" and would provide valuable assistance to state governments in planning and implementing technical education. This provision is extremely compatible with the intent of two major studies which are currently exerting significant influence on the future growth of our community college system: the North Carolina Governor's Commission on Workforce Preparedness and the Commission on the Future of the North Carolina Community College System.

The National Competitive Industry Workforce Act of 1991 is fundamentally sound legislation that involves the essential players necessary to advance technological education, improve workers' skills, and help America's industry remain competitive in a world economy.

Congressman Price's Technical Education and Training Act of 1991, HR 2936, would establish a national technical education and training program. The bill would do the following: facilitate technical training at community colleges; focus on recent high school graduates; and identify high school dropouts, in addition to workers who require special skills training or retraining, the unemployed, and underemployed.

Passage of HR 2936 is important to community colleges as well as the nation's industrial complex. Community and technical colleges have already been called on to respond to the new requirements for advanced technicians, and they are working vigorously to do so. The mix of programs in the North Carolina Community College System has shifted dramatically in the past eight years to more advanced, highly technical, and more expensive degree programs. With that shift has come a new set of challenges: the cost of the technology; the challenge of keeping faculty up to date in technologies where the half-life of knowledge may be less than five years; the cost of competing with industry for these faculty (as we do for 75 percent of our faculty); and the need for new relationships with the universities and industry--the creators, suppliers, and users of the new technology.

Within the North Carolina Community College System are several examples of programs on the cutting edge of technology to meet the challenges and demands for advanced technician training as provided in HR 2936:

- Central Piedmont Community College and Forsyth Technical Community College have integrated manufacturing centers sponsored with substantial resources from IBM.
- The North Carolina Center for Applied Textile Technology, formerly the North Carolina Vocational Textile School, has been transformed with a new focus on training and maintaining the skills of advanced technicians--done with all new technology supplied by high tech textile equipment manufacturers.
- The Southern Technology Council, sponsored by the Southern Growth Policies Board, is a consortium of community colleges providing technology transfer in new manufacturing processes to the small to medium sized manufacturing firms in the rural south. This model has confirmed the value of the National Centers for Technical Education and Training proposed in HR 2936.
- North Carolina community colleges have a variety of other special programs in robotics, industrial environmental engineering, and statistical process control, as well as quality management systems and applied technology centers. Our colleges are also experiencing dramatic expansions in a wide array of training programs in advanced health technologies.

The Outreach and Partnership Grants provided for in the act would benefit community colleges, four-year academic institutions, and students in transition between two- and four-year institutions. HR 2936 is vital to overcoming the technological disadvantage of America's workforce in a competitive global economy. I support its passage and encourage the members of this subcommittee to likewise support it.

Technical education is critical to the future competitiveness of America and its workforce. As stated in the 1990 report of the National Governors' Association, Excellence at Work:

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Increasing the competitiveness of the American workplace is a matter of national economic survival. All workers must dedicate themselves to increasing their skills and education while assuming greater responsibility for the quality of their work and the overall productivity of the firms in which they work. Higher order learning skills and state-of-the-art occupational skills will be the hallmark of the American workforce in the coming decades. Accelerating demands for new and advanced skills necessary for the competitive global economy will require access to relevant skill upgrading for all workers throughout their careers.

I commend the National Competitive Industry Workforce Act of 1991 and the Technical Education and Training Act of 1991 to this Subcommittee on Technology and Competitiveness. I encourage you to seek support for these bills among your House colleagues and to actively promote their passage.

Thank you for the opportunity to present this testimony.

STATEMENT FOR THE RECORD
OF
DR. ROBERT M. WHITE
UNDER SECRETARY OF COMMERCE FOR TECHNOLOGY
BEFORE THE
SUBCOMMITTEE ON TECHNOLOGY AND COMPETITIVENESS
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY
SEPTEMBER 17, 1991

Mr. Chairman and members of the Subcommittee, I am pleased to have this opportunity to submit a statement for the record in connection with this important hearing on legislative proposals to improve workforce training and technical education.

Because H.R. 2936 affects the programs and policies of the National Science Foundation, I respectfully defer to Dr. Luther Williams, NSF's Assistant Director for Education and Human Resources, to assess its merits.

Accordingly, my comments will be confined to your proposed "National Competitive Industry Workforce Act of 1991." This proposal calls upon the Secretary of Labor to establish a Youth Technical Apprentice Program, the Secretary of Education to establish statewide Technical Education and Training Networks, and the Secretary of Commerce to establish American Workforce Quality Partnerships. The latter would pay the federal share of the costs of establishing workforce training consortia between firms and community or technical colleges or other appropriate institutions of higher learning.

As you know, the President's Fiscal Year 1992 Budget embraced six fundamental National Educational Goals, previously agreed to by the Nation's Governors. These included the goal of ensuring that by the year 2000, every adult American will be literate and possess the knowledge and skills necessary to compete in a global economy. This goal was adopted out of recognition that approximately 75% of those who will constitute the American workforce in that year are already adults, but that 20-30 million of them lack the basic literacy skills necessary to function effectively in society, much less in the sophisticated environment that will increasingly characterize the American workplace.

When to these sobering numbers we add the various studies and statistics demonstrating the poor showing of our young people in math and science compared to our competitors, there is clearly cause for concern about the workforce at the start of the millennium that is less than a decade away.

As your hearing charter so cogently noted, Taylorism is essentially dead - good riddance, too! - and with it has died the notion that we can prosper by thinking of workers as little more than robots endlessly performing simple, repetitive, routine tasks. Indeed, with advances in manufacturing science and the imminence of intelligent manufacturing systems, we can't even think of machines that way any more!

Advanced manufacturing technologies have put an end to that chapter of industrial history centered around mass production concepts that no longer work except for the simplest of products with the longest life cycles, such as pencils and paper clips. As your charter noted, the tasks workers will be called upon to perform will be increasingly complex and the judgment that workers will have to exercise will require increasing degrees of sophistication.

This concerns all of us. As the Budget of the United States Government for Fiscal Year 1992 stated, "(i)mproving the skills of adults is a responsibility shared by the public sector, by employers and unions, by private training institutions (both as participants in adult education programs and as volunteers helping others to improve their skills)."

State governments are playing a substantial role in the development of adult education systems linked closely to economic development and employers and unions have undertaken significant efforts to enhance the skills of workers already on the job.

And business, too, is shouldering a good part of the burden - no small matter when it needs every precious dollar for investment in R&D in the advanced technologies necessary for them to remain competitive. The Office of Technology Assessment has estimated that business is spending some $30-$44 billion annually on employee training programs, and more if we factor in the informal, harder to measure training that takes place on the job.

I should also note that many larger firms are starting to work closely with their smaller partners - suppliers and customers alike - to help them establish similar worker training programs. We expect to explore ways of increasing this effort with agencies such as the Departments of Labor and Education.

And the federal government is certainly shouldering its share of the load to improve workforce quality. The President's FY 92 Budget contains substantial support in the form of direct assistance for training to prepare persons for entry into the labor market and it subsidizes, through the tax system, employer training of workers. Also included is substantial funding for research and information dissemination activities regarding literacy and skill levels in the adult population. The Administration's proposals include support for the Department of Education's vocational education and adult literacy activities, the Even Start Program, a revised Job Training Partnership Act, the Job Opportunities and Basic Skills program, and the Department of Labor's Commission on Achieving Necessary Skills and its National Advisory Commission on Work-Based Learning.

In addition, the Federal Coordinating Committee for Science, Engineering and Technology is proving itself to be a useful mechanism for inventorying and evaluating federal educational programs with a view to improving their efficiency and effectiveness. Commerce itself - mainly through our National Institute of Standards and Technology - maintains some of these, although most of them focus on very advanced educational levels.

Under these circumstances, Mr. Chairman, we do not need the new Commerce-administered American workforce quality grant program which would be authorized by Section 4 of the draft "National Competitive Industry Workforce Act of 1991." The proposal would authorize $50 million for FY 1992 and such sums as may be necessary for each of fiscal years 1993-1996 for this program. Given the multiplicity of ongoing activities within the federal government, the business sector, state and local governments and employee organizations, our focus should be on ways of ensuring that the public-private sector activities are properly coordinated. Therefore, we oppose the bill.

Commerce, through its membership on various interagency panels, such as FCCSET, can certainly play a significant role in this coordinative process. However, I should add that because our needs and educational expertise generally involve the workforce at its more scientifically and mathematically advanced levels, general coordinative or programmatic responsibility should be vested in agencies with broader responsibilities for education and the well-being of the workforce.

We certainly want to work closely with them - but in the final analysis, Commerce's most important contribution will be on helping American firms achieve and maintain the technological competitiveness to thrive in the year 2000 and beyond.

Thank you, Mr. Chairman, for the opportunity to make our views a part of the record of this important hearing.

STATEMENT FOR THE RECORD
OF ROBERTS T. JONES
ASSISTANT SECRETARY OF LABOR
FOR EMPLOYMENT AND TRAINING
BEFORE THE
HOUSE SUBCOMMITTEE ON TECHNOLOGY AND COMPETITIVENESS
COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY

Mr. Chairman and Members of the Subcommittee, I am pleased to have this opportunity to submit a statement for the record on H.R. 3507, the American Industrial Quality and Training Act of 1991, and H.R. 2936, the Technical Education and Training Act.

I am gratified by the Subcommittee's interest in examining the critical issues of training and the skills of the American work force, the organization of the workplace, and their importance to the ability of the United States to maintain its leadership position in the new, competitive global economy. While we support the goals of this legislation, we believe that these bills are unnecessary in light of ongoing activities of this and other Departments. Accordingly, we oppose enactment of H.R. 3507 and H.R. 2936.

Before discussing the specifics of these bills, I would like to address the general issues of promoting a skilled workforce and enhancing our industrial competitiveness. If our nation is to remain competitive and continue to provide our people with economic opportunity and security then we are going to have to wage a workplace revolution. We have to rethink and restructure systems that have long outlived their usefulness and appropriateness.

The centerpiece of this workplace revolution is a definition of job security that matches the realities of global competition and technological change. Today, employers' needs change daily and along with this, jobs change. Workers are called upon to be more mobile, more adaptable, and display higher and higher levels of skills.

The result is that traditional approaches to achieving job security -- a reliance on the company or a union or the government -- have become a hollow promise to the American worker. Jobs are found where the economy is robust and growing. And job security is much more dependent on skills, the willingness and ability to learn, to change, and to grow.

Secretary Martin's goal over the last eight months has been to develop an agenda that is in effect a battle plan for the new workplace revolution -- one is designed to support American workers as they try to achieve a new kind of job security that ensures each and every individual the opportunity and the environment needed to live up to his or her full potential.

This agenda supports the President Bush's AMERICA 2000 education strategy and will focus the nation's attention not only on the benefits -- but on the necessity -- of lifelong learning.

The Department of Labor has several initiatives under way which support this agenda. For example, the Secretary's Commission on Achieving Necessary Skills (SCANS) has defined the fundamental skills and achievement levels needed to gain access to jobs with career ladders in the 1990s. We are actively providing information to help communities implement the recommendations of the first SCANS report. The Department is also studying the benefits of work reorganization and its impact on training needs, worker productivity, product and service quality, and firm performance. We intend to disseminate the results of this study and information on best practices and models in worker training and education to help U.S. firms, labor unions, and workers improve America's competitive position. Other related initiatives are discussed later in my statement.

The legislation being considered by the Subcommittee is intended to support the types of efforts that are needed to enhance the skills and know-how of American working men and women. I will limit my comments to the Department of Labor's role in the respective bills. H.R. 3507 would establish a number of new programs and responsibilities for the Departments of Labor, Education, and Commerce. The bill would authorize a Youth Technical Apprenticeship program administered by the Department of Labor. The Secretary would be authorized to make grants to establish three- or four-year apprenticeship-like programs consisting of two years of secondary school preceding graduation and one or two years of postsecondary education. In FY 1992, $50,000,000 would be authorized for the program, and such sums as may be necessary for each of the following four years.

The Secretary of Labor would also be responsible for annually compiling information and statistical data on worker training financed by employers in the United States. Such sums as may be necessary for fiscal years 1992-1996 would be authorized to carry out this activity.

Your letter asks whether the legislation duplicates any Department of Labor programs. The Department of Labor does have under way several initiatives aimed at accomplishing the same objectives as those addressed in the two bills.

In September of 1990, we funded six youth apprenticeship-type demonstration projects to develop new instructional models that link learning in the classroom with worksite learning and experience. These models represent a broader range of occupations and industries than those specified in the bills. We favor this broader occupational focus in order to provide young people greater accessibility to new instructional models. The projects are designed to prepare young people for career paths that include post-secondary education. They are part of a Departmental initiative to help young people make a smooth transition from school to the workplace, and we are working closely with the Department of Education in this effort.

The Department of Labor has also taken a number of steps to explore with business ways to encourage more and more effective training and utilization of workers. We have funded research and demonstration projects in this area. We also established a National Advisory Commission on Work-Based Learning, which is charged to provide the Department with advice on ways to expand and improve work-based learning. This 18-member Commission is chaired by Jack MacAllister, Chairman of U.S. West, and includes prominent business representatives from all sectors of the economy as well as representatives from education, labor, government, and public service organizations. We are currently considering a number of recent Commission recommendations on expanding work-based learning and developing voluntary industry-based skill standards and worker skill certifications.

The Department of Labor is also exploring with the Department of Commerce ways to help business and American workers meet the global competitive challenge.

With regard to the provision directing the Department of Labor to survey industry training programs, the Department of Labor's Bureau of Labor Statistics and Employment and Training Administration are already developing a broad-based survey covering the goods and services industries to collect information on the nature and extent of work-based training. The information produced by this survey can help us encourage employers to increase training investment levels and identify where investments in skill development are low.

In sum, since the Department is already engaged or developing activities very similar to those in the proposed legislation, we believe that such legislation is unnecessary.

We hope this information proves helpful to the Subcommittee. Again, I appreciate the opportunity to comment on these proposals.

Opening Statement of John W. Olver at Technology and Competitiveness Subcommittee mark-up of H.R. 2936 (Price) and H.R. 3507 (Valentine), October 31, 1991:

Thank you Mr. Chairman. I would like to express my appreciation for your leadership on this important subject demonstrated both in the legislation before us, and in the hearing of last month.

I would also like to thank Mr. Price for his leadership on this legislation, and for working with me to address my concerns and expand the reach and effectiveness of the bill.

I am co-sponsoring both of these bills and I believe they are important initiatives to address our severe needs for increased technical education and training. The Commission on the Skills of the American Workforce was quite clear on the choice facing us -- as a country we must increase our workforce skills or be forced into a losing battle with low wage countries. We need to improve the technical education and training being offered in our schools, colleges, and manufacturing firms. Together, these bills represent a significant step towards improving our country's industrial competitiveness.

Again, I would like to thank the Chairman, and Mr. Price as well, for their work in highlighting the need for this legislation, and in bringing these important issues to the subcommittee.

STATEMENT FOR THE RECORD
OF THE SECRETARY OF EDUCATION
BEFORE THE
HOUSE SUBCOMMITTEE ON TECHNOLOGY AND COMPETITIVENESS
COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY

Mr. Chairman and members of the Subcommittee, I am pleased to have this opportunity to submit a statement for the record on two bills under your consideration, the "American Industrial Quality and Training Act of 1991" (H.R. 3507) and the "Technical Education and Training Act of 1991" (H.R. 2936).

We support most of the goals of both bills. Improving our country's education system to produce more high-skilled workers, addressing the education needs of non-college bound youth to help them make the transition from school to work, and providing for the training and retraining needs of our existing workforce are purposes that are clearly consistent with the President's AMERICA 2000 education strategy. Only by motivating and enabling individuals to obtain the education and learn the skills necessary to function as productive members of society can our country hope to remain competitive in a global economy.

However, we believe that the proposals outlined in the two bills before you duplicate many of the activities authorized under the Adult Education Act, the Carl D. Perkins Vocational and Applied Technology Education Act, and the Job Training

Partnership Act. The newly reauthorized Perkins Act, which stresses development of performance standards, integration of academic and vocational education, development of vocational education programs that are responsive to business and economic needs, coordination of vocational education programs at the secondary and postsecondary levels, and responsiveness to the needs of at-risk students, already provides a substantial framework for creating a workforce that has the skills needed to keep our Nation competitive. The Adult Education Act provides services to those who, because they have limited English proficiency or have not succeeded in or been well served by the education system in the past, lack the literacy skills needed to become productive members of society. The Job Training Partnership Act authorizes a unique public-private partnership to provide broad-based education, training, and employment services to economically disadvantaged adults and youth.

The following are specific comments on the two bills that address the questions in your letter.

AMERICAN INDUSTRIAL QUALITY AND TRAINING ACT OF 1991, H.R. 3507

Youth Technical Apprenticeship Programs

Section 3 of the bill would establish a Youth Technical Apprenticeship program administered by the Department of Labor.

The Secretary would be authorized to make grants to establish three- or four-year apprenticeship-like programs consisting of two years of secondary school preceding graduation and one or two years of postsecondary education. The program would consist of a common core of proficiency in mathematics, science, social science, and English and more applied technical or industrial skills designed to lead to an associate degree or other certificate of technical skills accomplishment. The program would also include rotational work assignments for students within a specific manufacturing or technology-based company for the length of the program.

While I believe that the concepts underlying this proposed program are sound, I would point out, however, that the Business-Labor-Education Partnership for Training program and the Tech-Prep Education program authorized under Title III, Parts D and E, of the Perkins Act incorporate the primary elements of this proposed program.

Under the Business-Labor-Education Partnership program the Secretary of Education can make grants to consortia of educational institutions and business, industry, labor organizations, or apprenticeship programs to carry out a wide variety of activities including apprenticeship and internship in industry. This program has not been funded to date.

The Tech-Prep program provides grants to States to establish four-year technical preparation programs that lead to an associate degree or certificate in a specific career field. These programs consist of two years of secondary school and then two years of higher education, or a two year apprenticeship program, and are operated by consortia made up of local educational agencies or schools and postsecondary institutions. Currently funded at $63.4 million, the Tech-Prep program operates as a formula program to the States.

Finally, the Department of Labor's apprenticeship and school-to-work demonstration programs are exploring models similar to the proposed Youth Technical Apprenticeship programs.

Because the purposes of the Youth Technical Apprenticeship programs can be largely achieved through the three special programs I have just described, I believe enactment of this new program is unnecessary.

American Workforce Quality Partnerships

Section 4 of the bill would establish an American Workforce Quality Partnership program to be administered by the Department of Commerce. The Secretary would make grants to consortia of industries and institutions of higher education to train and educate a significant proportion of the industrial partners at all organizational levels through both workplace-based and classroom-based programs of training. Participating industries must demonstrate a substantial commitment to restructuring their organizations by adopting high-performance or total quality management strategies to renew their competitive edge.

The Department of Commerce has stated its position, and we concur, that this new program is not necessary in view of the number of activities that we are already taking place within the Federal Government, the business sector, State and local governments, and employee organizations. We support proper coordination of these public-private activities.

State-wide Technical Education and Training Networks

Section 5 of the bill would authorize the Secretary of Education to make grants to States to establish state-wide technical education and training systems for the provision of technical, technician, or technological skills and education. In general, the program would require States to review and assess existing technical education delivery systems and also to evaluate current program effectiveness and availability.

Many of the activities carried out under Section 5 would duplicate coordination and evaluation activities already taking place in this area. Under the Perkins Act, States are currently required to coordinate Federal and State vocational and technical education programs. The Perkins Act also requires States to perform a State-wide assessment of their entire vocational and technical education programs during each State plan period. State plans under the Perkins Act are also reviewed by the State Job Training Coordinating Councils and independent State councils on vocational education to ensure program coordination and availability.

Additionally, the House recently passed amendments to the Job Training Partnership Act that would permit Governors to establish State Human Resource Investment Councils in order to coordinate further various Federal human resource programs including vocational, training, and literacy programs.

Because these coordination and assessment activities already occur under the Perkins Act, I believe a grant program to encourage identical or similar activities is unnecessary.

Report on Total Quality Schools

Section 7 of the bill would require the Secretary of Education to submit to Congress a report on the feasibility of adopting principles of total quality management to improve the quality and relevance of secondary and postsecondary education.

The principles of total quality management are already being implemented in schools through school-based management. Giving administrators and teachers the skills and knowledge to run their own schools and to be held accountable is a major thrust of school reform efforts.

Technical Education and Training Act of 1991, H.R. 2936

Section 3 of the bill would establish a National Advanced Technical Education and Training Program administered by the National Science Foundation. The Director would be authorized to make grants to carry out an advanced technical education and training program under which accredited associate-degree-granting colleges would provide educational training in technical competencies in strategic fields.

Although the concepts underlying this proposed program have merit, the purposes of the program can be largely achieved through the Tech Prep program authorized under the Perkins Act. Therefore I believe enactment of this program is unnecessary.

I would also note that many two-year postsecondary institutions are aggressively creating and operating advanced-technology programs. In fact, in 1988, several institutions representing a variety of advanced technology centers (ATC's) met to discuss the feasibility of forming an ATC network. That meeting led to the establishment of the National Coalition of Advanced Technology Centers, which is an affiliate of the American

Association of Community and Junior Colleges. The mission of that organization is to promote the infusion of proven advanced technology in U.S. industries through community, technical, and junior colleges. At present there are over 40 ATC's in at least 18 states.

In closing, I would like to restate that while the Department of Education agrees with the intent of these bills, it opposes both because the proposed programs would duplicate programs currently operating at the Department of Education.

Thank you, Mr. Chairman, for the opportunity to present my views.

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